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CHAPTER IV.

ENTERIC OR PYTHOGENIC FEVER.

SECT. I.—DEFINITION OF THE DISEASE.

AN endemic disease, generated and propagated by certain forms of decomposing organic matter. Its symptoms are: a commencement often insidious, or marked by slight rigors, a sensation of chilliness, or profuse diarrhœa; pulse usually frequent and soft, but pulse and temperature both subject to great variations in same patient; febrile symptoms in mild cases often remittent; tongue red and often fissured, occasionally becoming dry and brownish; in most cases, but not invariably, increased splenic dulness, tympanitis, abdominal tenderness, gurgling in the iliac fossæ, and diarrhœa, with or without intestinal hæmorrhage; skin warm, with occasional sweats; an eruption of isolated, elevated, rose-coloured spots, vanishing on pressure, first appearing between the seventh and fourteenth days, and coming out in successive crops, each of which lasts two or more days; frequently epistaxis; prostration coming on late, patient rarely taking to bed before the seventh or tenth day; head-ache, sometimes followed by stupor and active delirium, but mind often clear throughout the attack, even in fatal cases; dilated pupils; the disease protracted to the twenty-fourth or thirtieth day, and occasionally, though rarely, followed by a relapse of all the symptoms, including the eruption; after death, disease of the solitary and aggregated glands of the ileum, and enlargement of spleen and mesenteric glands.

SECT. II.—NOMENCLATURE.

1.—*Synonyms derived from its supposed resemblance to Typhus.*

Typhus nervosus (*Sauvages*, 1760); Typhus mitior and Synochus *pro parte* (*Cullen*, 1769); Abdominal Typhus and Darm-typhus (*Autenrieth*, 1822, and *German Writers generally*); Synochus and Typhus with Abdominal Affection (*Southwood Smith*, 1830); *Fièvre Typhoïde*

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(*Louis*, 1829; *Chomel*, 1834); Typhus gangliaris vel entericus (*Ebel*, 1836; *Schönlein*, 1839); Typhoid Fever (*Stewart*, 1840; *Bartlett*, 1842; *Jenner*, 1849); Mild Typhoid Fever (*Copland*, 1844); Ileo-typhus (*Griesinger*, 1857); Typhia (*Farr*, 1859); Typhus (*many writers*).

2.—From its Mode of Prevalence.

Febris non-pestilens (*Forestus*, 1591); Endemic Fever (*many writers*); Autumnal or Fall Fever (*Flint*, 1852; and *American writers generally*).

3.—From its Remittent Character.

Πυρετός ημικραιός? (*Hippoc.*); Hemitritæus? Tritæophyas? and Triphodes? (*auctor. antiq. var.*); Febris semitertiana seu composita (*Galen?* *Forestus*, 1591; *Spigelius*, 1624); Tritæophya typhodes (*Mangetus*, 1695); Remittent Fever (*T. Sutton*, 1806); Infantile Remittent Fever (*Evanson and Maunsell*, 1836; and *many writers*).

4.—From its Lengthened Duration.

Febris lenta (*Forestus*, 1591; *Willis*, 1659; *Linnæus*, 1763; *Vogel*, 1764); Slow or Lent Fever (*Strother*, 1729; *Langrish*, 1735); Febris chronica? (*Juncker*, 1736); Common Continued Fever (*Armstrong*, 1816); Fièvre continue (*Lerminier and Andral*, 1823).

5.—From its supposed Nervous or Hysteric Character.

Nervous Fever (*Gilchrist*, 1734); Slow Nervous Fever (*Huxham*, 1739); Febricula, or Little Fever, commonly called the Nervous or Hysteric Fever, Fever on the Spirits, Vapours, etc. (*Manningham*, 1746); Irregular Low Nervous Fever (*Fordyce*, 1791); Nervenfieber (*German writers*); Fièvre nerveuse (*French writers*); Low Fever (*many writers*).

6.—From the occurrence of Putrid or Septic Symptoms.

Febris putrida (*Riverius*, 1623); Febris putrida quæ vulgo lenta appellatur (*Willis*, 1659); Febris putrida nervosa? (*Wintringham*, 1752); Febris putrida aut biliosa (*Tissot*, 1758); Febris a putredine orta (*A. Trallianus*, quoted by *Burserius* as *Syn. for his Feb. gastric.* *ac.*, 1785); Febris atacta, pro parte (*Selle*, 1770); Fièvre ataxique, pro parte, and F. adéno-méningée (*Pinel*, 1798); Entérite septicémique (*Piorry*, 1841); Sepimia (*Hare*, 1853).

7.—From its resemblance to Hectic Fever.

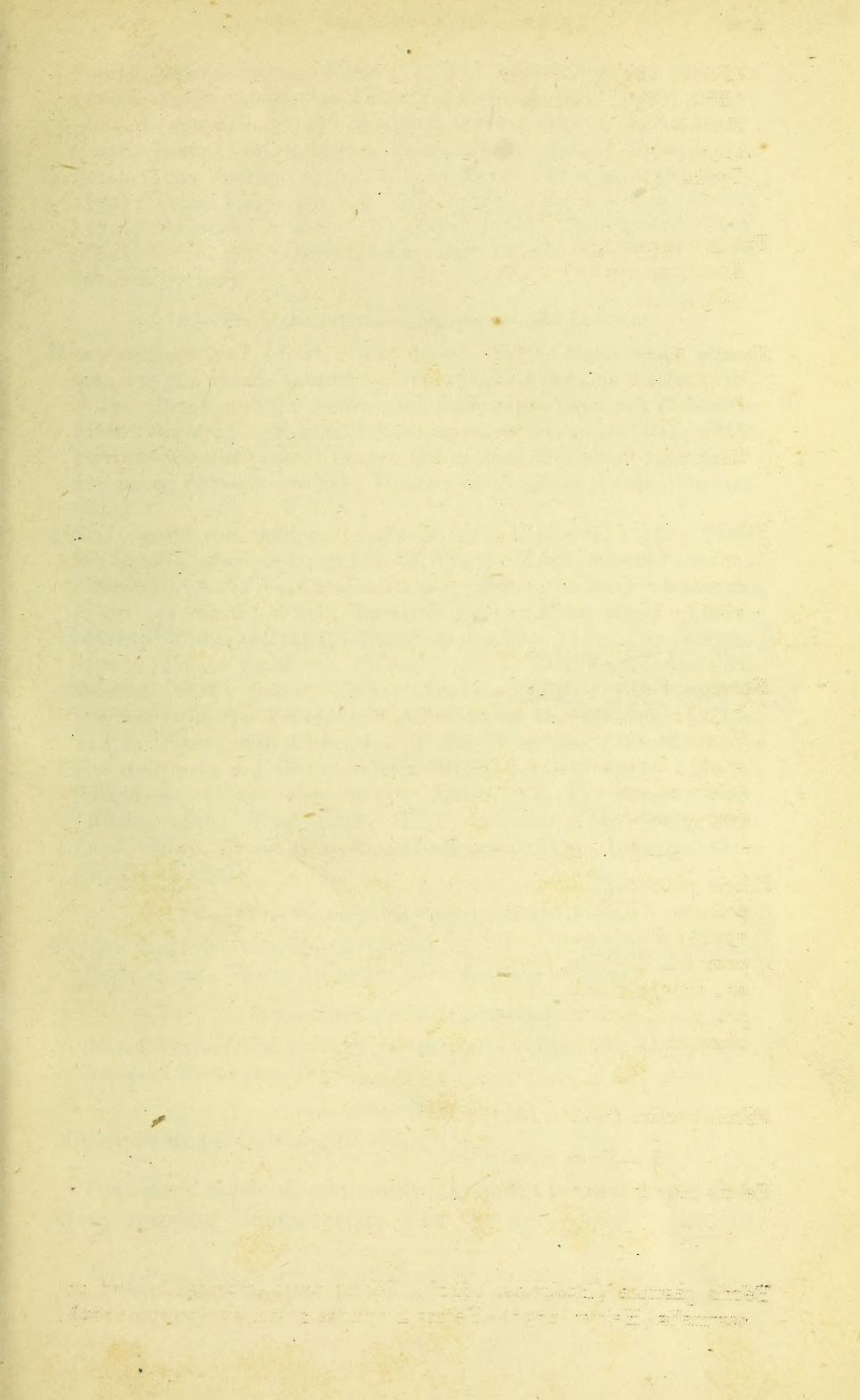
Febris hectica (*Willis*, 1667); Infantile hectic fever (*various writers*).

8.—From the absence of the true Typhus Eruption.

Febris petechizans vel spuria (*Hoffmann*, 1699).

9.—From the common occurrence of Gastric Derangement, Bilious Vomiting, etc.

Febris gastrica (*Ballonius*, 1640); Febris acuta stomachica aut intestinalis (*Heister*, 1736); Febris glutinosa gastrica (*Sarcone*, 1765);



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Febris gastrica acuta (*Burser.*, 1785); Fièvre méningo-gastrique (*Pinel*, 1798); Gastrisches Fieber (*Richter*, 1813); Fièvre gastrique (*Dict. des Sc. Méd.*, 1816); Epidemic Gastric Fever (*Cheyne*, 1833); Gastric Fever (*Craigie*, 1837); Febris biliosa (*Galen ? River.*, 1623; *Stahl*, 1700; *Juncker*, 1736); Bilious Fever (*Pringle*, 1750; *Rutty*, 1770); Febris biliosa putrida (*Selle*, 1770); Febbre biliosa (*Benelli*, 1775); Synochus biliosus (*Sauvages*, 1760); Bilio-gastric Fever (*Copland*, 1844); Gastro-bilious, and Bilious Continued Fever (modern writers).

10.—From the Intestinal Symptoms and Lesions.¹

Febris colliquativa? (*J. R. Fortis*, 1668); Febris stercoralis? (*Quenay*, 1753); Febris mucosa (*Selle*, 1770); Febris pituitosa (*Stoll*, 1785; *Strack*, 1789); Febris colliquativa primaria seu essentialis (*Burserius*, 1785); Morbus bilioso-mucosus (*Knaus*, 1786); Febris pituitosa nervosa (*Jacobi*, 1793); Schleimfieber (*Kanz*, 1795; Fièvre muqueuse (French writers); Mucous or Pituitous Fever (*Copland*, 1844).

Febris mesenterica maligna (*Baglivi*, 1696; *Hoffmann*, 1699); Febris intestinalis vel mesenterica (*Riedel*, 1748); Febris mesenterica acuta (*Burchard*, quoted by *Burserius*, 1785); Fièvre entéro-mésentérique (*Petit and Serres*, 1813); Enteritic Fever (*Mills*, 1813); Gastro-entérite (*Broussais*, 1816); Entero-mesenteric Fever (*Abercrombie*, 1820); Febris mesaraica (*Wendt*, 1822); Dothiésentérite (*Bretonneau*, 1826; *Leuret*, 1828; *Christison*, 1840); Muco-enteritis (various writers); Fever, with Affection of the Abdomen (*Alison*, 1827); Fever, with Ulceration of the Intestines (*Bright*, 1829); Gastro-enteric and Gastro-splenic Fever (*Craigie*, 1837); Entérite folliculeuse (*Cruveilhier*, 1835; *Forget*, 1841); Enteric Fever (*Ritchie*, 1846; *Wood*, 1848; *W. T. Gairdner*, 1859; *Coll. Phys. Lond.*, 1869); Febris tympanica (*Babington*, 1853); Intestinal Fever (*W. Budd*, 1856).

11.—From its supposed dependence on Worms.

Typhus hystérico-verminosus (*Sauvages*, 1760); Febris verminosa (*Selle*, 1770); Worm Fever pro parte (various writers).

12.—From its Mode of Origin.

Night-soil Fever (*Brown*, 1855); Pythogenic Fever (*Murchison*, 1858); Cess-pool Fever (var.).

13.—Other Designation.

Miliary Fever (*Pringle and De Haen*, 1760).

The term *typhoid*, commonly applied to this fever, is in many respects inappropriate. In the first place, it literally

¹ Many of the cases described by Cullen and his successors, as 'Enteritis Erysipelatosa,' were probably examples of this fever. (See description of it by *Alison*, 1844 (No. 2), p. 323).

means *like typhus*, and consequently it is at variance with all precedent in the accepted nomenclature of species in science. Secondly, it is constantly employed in an adjective sense, to designate a group of symptoms which may appear in the course of any disease; and thirdly, a large proportion of the cases of so called 'typhoid fever' exhibit no symptoms of a typhoid or typhus-like character. It follows, that the use of the term typhoid to designate a specific fever tends to create confusion; and, indeed, it is probable that this very name has contributed to make many regard the fever in question as merely a variety of typhus. At the same time, it may be doubted, if any of the numerous synonyms by which the disease has been known, be more appropriate. For example, I am inclined to question the propriety of employing a name derived from the abdominal lesion, as most such designations are calculated to revive the exploded doctrines of Broussais. Even the term *Enteric Fever*, adopted by the London College of Physicians in its 'Nomenclature of Diseases,' is apt to convey the erroneous impression that the fever is the result of the intestinal lesion; while practically it leads to errors in diagnosis and treatment. Medical men ~~naturally~~ decline to call a fever 'enteric,' in which, as often happens, there are no enteric symptoms, and hence the intestinal lesion is apt to be overlooked until it unexpectedly becomes a source of danger. This mainly accounts for the circumstance that in the returns of the Registrar-General deaths are weekly ascribed to 'Simple Continued Fever,' a disease which in twenty-five years has not once been fatal in the London Fever Hospital. These considerations induced me to suggest the name *Pythogenic Fever*, derived from what I endeavoured to show was the cause of the fever (*πυθογενής* from *πύθω* (*πύθωμαι*, putresco) and *γεννάω*).^m The reception which this name has met with has encouraged me to retain it in this work.ⁿ

SECTION III.—HISTORICAL ACCOUNT.

SOME of the descriptions of the Greek writers probably referred to enteric fever. Hippocrates states that in the course of two successive autumns, he met with many cases of fever of the continual

^m See MURCHISON, 1858 (3). Objections have been raised to the etymology of the word *πυθογενής*; but in Scapula's Greek Lexicon a host of similar words will be found, e.g. *Ἀλιγενής*, *ē mari ortus*; *Ἀφρογενής*, *ē spuma ortus*; *Πυριγενής*, *igni genitus*. The English affix *ic* to an adjective simply denotes belonging, relating, or pertaining to.

ⁿ The designation has been repeatedly noticed with favour in the Reports of the Registrar-General, and has been adopted in the Reports of the Wieden Hospital in Vienna. (GRIESINGER, 1864, p. 145).

type, characterized by diarrhœa, offensive watery stools, bilious vomiting, tympanitis, abdominal pain, 'red rashes,' epistaxis, sleeplessness, or a tendency to coma, delirium and subsultus, irregular remissions, a lengthened duration, and great emaciation.*

Galen's *Hemitritæus*, which was thought to be produced by the grafting of a tertian on a quotidian intermittent, and particularly that variety designated bilious fever, (*χολοδὸς πυρετός*), was probably the same disease.^p But whatever was the nature of the cases referred to by Galen, there can be little doubt that the *Hemitritæus* or *Febris semitertiana* of later writers was true enteric fever. Spigelius speaks of this fever as common in various parts of Italy in the early part of the seventeenth century. Among the symptoms he mentions abdominal pain and tenderness, bilious vomiting, urgent diarrhœa and sometimes melœna, sleeplessness or lethargy, delirium, irregular remissions, no marked crisis, and occasional relapses. The *post-mortem* appearances, moreover, are said to have consisted in inflammation and sometimes gangrene and sphacelus of the small and large intestines. The accounts of several autopsies are given in his work. Of one, he says, 'In dissecto cadavere reperta sunt intestina tenuia inflammata; ileum qua colo et cœco adhœrebat, sphacelatum:' of another, 'In eo tenuia intestina inflammata vidimus: et ilei portionem magnam versus colon sphacelatum.' He maintained that the fever was not symptomatic of the local inflammation, but depended on a putrid substance in the veins. As to treatment, he recommended copious venesection, antimony, warm fomentations and clysters.^q

Not long after, similar observations were made by Panarolus and Thomas Bartholin. According to Panarolus, many cases of fever proved fatal at Rome in 1694, and on dissection the intestines 'apparebant tanquam exusta.'^r Now various writers have compared the yellow sloughs often found adherent to Peyer's patches in enteric fever, to the superficial eschars resulting from the application of the actual cautery to a mucous surface.^s

About the same time, Willis in England described a fever which differed from the *febris pestilens* (typhus) in being less contagious, in the absence of eruption, in its longer duration, in the imperfect crisis, and in its tendency to produce local complications. He alluded particularly to a dysenteric form of fever accompanied by pustules and ulcers in the small intestines, which he compared to the external pustules of variola, an idea which French writers long afterwards claimed the credit of originating.^t

Sydenham also described a fever as distinct from the *febris pestilens*. It varied greatly in its severity, lasted from fourteen to thirty days, and was characterized by great tendency to diarrhœa and vomiting,

* *De Epid.* lib. i. Syd. Soc. Transl. i. 354-9 and 420.

^p GALEN, *Op. Om.* ed. Basil. v. 362; ed. C. G. Kühn, Lipsiæ, 1824, vii. 350; PAULUS ÆGINETA, Syd. Soc. Transl. vol. i.; Celsus, lib. iii. 8.

^q SPIGELIUS, 1624.

^r PANAROLUS, 1654, pent. iv. obs. 8.

^s RITCHIE, 1855, p. 262.

^t WILLIS, 1659, ed. 1682, p. 86.

by delirium, epistaxis, etc. Purgatives were always injurious. He recommended bleeding and emetics at the commencement, enemata of milk and sugar, opium to check the diarrhoea, and wine when the fever assumed a hectic character.^u

Baglivi of Rome, in the latter part of the seventeenth century, described the *hemitriticus* of previous writers under the title of *Febris mesenterica*, and maintained that it was always accompanied by, and depended on, inflammation of the intestines and enlargement of the mesenteric glands. It was of an irregularly remittent character, but was influenced by critical days, although in most cases it lasted from fourteen to twenty-one days. In some cases, he observed, there was scarcely any fever, when, all at once, the patient died from inflammation of the viscera. He recommended moderate venesection, baths, warm fomentations to the abdomen, and, above all, patience. Wine and bark, which he thought of great service in *febris pestilens* (typhus), he believed to be highly injurious in mesenteric fever, and he added: — ‘Fuge purgantia tanquam pestem.’^v

Lancisi, who wrote soon afterwards on the fevers of Rome, observed that on opening the bodies of certain patients who had died of semitertian fever wounds were found in the intestines, which in some instances had perforated all the coats. The ulcers were spoken of as wounds, because they were thought to be produced by intestinal worms. According to Lancisi, semitertian fever differed from the *febris castrensis* (or typhus) in the presence of lumbrici, which irritated and wounded the intestines.^w

In 1699, F. Hoffmann of Halle described the semitertian fever as accompanied by abdominal pain, vomiting and purging, and sometimes by delirium. After death, he says, gangrene and sloughing of the small intestines were found. The same writer mentions another fever under the title of *Febris petechizans vel spuria*, which he distinguished from the *Febris petechialis vera* (or true typhus). This was probably also enteric fever. It was characterized by an insidious commencement, vomiting and purging, and by the appearance about the seventh day of an eruption on the trunk, consisting of elevated papules, which disappeared completely upon pressure. In both the semitertian fever and the *febris petechizans*, depletion was considered beneficial, and stimulants injurious.^x

Strother, in his account of the epidemic of typhus at London in 1727–29, distinguished it from the *slow fevers*, which were of a somewhat remittent character, and which were dangerous on account of their insidious commencement, and of their proving suddenly fatal. One form of this fever, viz., ‘the Lent Fever, is a symptomatical fever, arising from an inflammation, or an ulcer, fixed on some of the bowels.’ The spleen and liver were usually enlarged. Bleeding he regarded as ‘the adequate cure.’^y

^u SYDENHAM, 1685, ed. 1844, lib. i. 4, p. 39. ^v BAGLIVI, 1696, ed. 1704, p. 51.

^w LANCISI, 1718, pp. 55, 57.

^x HOFFMANN, 1699, ed. 1740, vol. ii. cap. 5, p. 40, and cap. 10, p. 75.

^y STROTHER, 1729, pp. 15, 164.

In 1734, Dr. Ebenezer Gilchrist of Dumfries published an 'Essay on Nervous Fever.' His description evidently refers to enteric fever. Thus he speaks of its long duration, and of its frequent occurrence in children. The symptoms varied greatly in different cases, but among the most common were diarrhoea, abdominal pain, melœna, epistaxis, partial sweats which gave no relief, and in the advanced stages delirium and other cerebral symptoms. He observes:—'I take this fever to be very different in its nature and changes from other fevers' prevalent in Scotland.^a

In the following year, Dr. Browne Langrish of London drew a similar distinction between the '*Slow Nervous Fevers*' and the '*Malignant Continued Fever*,' the former being characterized by a quick but variable pulse, vomiting, purging, and a duration of from twenty to thirty days. In the treatment of nervous fever, Langrish condemned both bleeding and purging.^a

Four years later, Huxham published the first edition of his 'Essay on Fevers,' in which he devoted a chapter to the differences between the '*Slow, Nervous Fever*,' and the '*Putrid, Malignant, Petechial Fever*.' His descriptions leave little doubt, that by the former title he referred to enteric fever, and by the latter, to typhus. He observes, 'I cannot conclude this Essay on Fevers, without taking notice of the very great difference there is between the *putrid malignant* and the *slow, nervous fever*; the want of which distinction, I am fully persuaded, hath often been productive of no small errors in practice, as they resemble one another in some respects, though very essentially different in others.'^b

In 1746, Sir Richard Manningham F.R.S. gave an excellent description of enteric fever, under the title of '*Febricula, or Little Fever*.' This fever, he said, was popularly designated the '*Nervous or Hysterical Fever, Low Continued Fever, Fever on the Spirits, Vapours, Hypo, or Spleen*.' Among the symptoms were, a red, often dry tongue, abdominal pains, diarrhoea, hæmorrhages, quick but variable pulse, loss of memory, and in a few cases slight delirium. He dwelt particularly on its insidious origin, and said that at the beginning it was apt to be disregarded, 'till, at length, more conspicuous and very terrible symptoms arise, upon which the physician is sent for in the greatest hurry, and the little, neglected fever proves of very difficult and uncertain cure, and too often becomes fatal in the end.' He condemned the practice of bleeding, and recommended cordials and diaphoretics.^c

Not long after, a discussion arose between Sir John Pringle and Professor De Haen of Vienna, as regards the treatment of fever. De Haen advocated the necessity of blood-letting, whereas Pringle observed that 'many recovered without bleeding, but few who had lost much blood,' and recommended stimulants. It turned out, however, that these two observers were dealing with different diseases,

^a GILCHRIST, 1734, p. 347.

^a LANGRISH, 1735, p. 343.

^b HUXHAM, 1739.

^c MANNINGHAM, 1746.

Pringle's malignant fever of the hospital and jail with petechiæ was typhus; whereas De Haen's petechial and miliary fevers were, for the most part, enteric. Pringle gives an unmistakable description of the eruption of typhus; but the eruption in De Haen's fevers is described as consisting of isolated round elevated spots, which came out in successive crops, and which were occasionally interspersed with true petechiæ and vibices. This difference was pointed out by Pringle, who, in his reply to De Haen's attack, observed that one great cause of confusion was the undefined meaning of the term *petechiæ*, and added: 'I have never considered the jail or hospital fever and the miliary fever as similar, and indeed I may venture to say, that, as the symptoms of the two are so much unlike, they ought to be treated as different in species,' and again: 'The *miliary fever* is incident to all ranks of people, living in the best air and in the most cleanly manner, whereas the *malignant fever*, which I treat of, is scarce to be seen but among the lowest people crowded together in close and foul places, such as in military hospitals, jails, and transport-ships.'^d

De Haen's miliary fever was described by his successor Stoll, under the designations of *pituitous* and *slow nervous fever*. Stoll relates the case of a boy who died on the fourteenth day of this fever. His symptoms had been vomiting, diarrhœa, and colicky pains, associated with general fever; but this was so slight, that until the twelfth day, he was able to walk to the hospital for medicine. After death, the small intestines were found inflamed and gangrenous and the mesenteric glands enlarged, and near the lower end of the ileum there was a perforation.^e

Many other accounts of enteric fever on the Continent were published during the eighteenth century. Riedel described a *febris intestinalis*, in which the lower portion of the ileum was found gangrenous after death.^f The same fever is also reported as very prevalent at Stuttgart, in 1783;^g at Göttingen, in 1785; and at Hildesheim, in 1789.^h Not a few writers pointed out the difference between it and typhus. Burserius, for example, after describing with tolerable accuracy the symptoms and *post-mortem* appearances of enteric fever, added, that although it sometimes simulated petechial fever, '*multum discrepare videtur*.'ⁱ In 1760-1, an epidemic of fever occurred at Göttingen, which has acquired some notoriety, and requires particular notice. It was described by Roederer and Wagler, under the name of *morbus mucosus*, and has been regarded by most succeeding writers as identical with the pituitous fever of Stoll and the typhoid fever of modern times. But, after carefully reading the original monograph, I doubt the correctness of this view, and am of opinion that the fever referred to was probably for the most part typhus complicated with

^d PRINGLE, 1750; 4th ed. 1764, app. pp. 99, 101; DE HAEN, 1760; RITCHIE, 1855, p. 264; JENNER, 1853, p. 416.

^e STOLL, *Rat. Med.* ii. 407; RITCHIE, 1855, p. 265.

^f RIEDEL, 1748, p. 45.

^g CLEIN, 1837.

^h DUNCAN'S *Annals of Med.* 1796, i. 73.

ⁱ BURSERIUS, 1785, p. 449.

8 dysentery. The disease broke out in a crowded, famished garrison, during a siege, in November 1760. Roederer and Wagler regarded it as a degenerated form of dysentery, with which the garrison had been afflicted for three months before. Although the intestines were found after death ulcerated and gangrenous, these lesions were always in the large intestines. In thirteen cases, the *post-mortem* appearances are described with great minuteness, but in none was the ileum ulcerated; while in the general observations on the anatomical lesions, it is remarked concerning the small intestines: 'Tunica interna, licet inflammata, tamen continua est.' The enlargement of the mucous follicles figured and described were observed in the stomach, duodenum and colon, and in only one case is any mention made of enlargement of the agminated and solitary glands of the ileum.^j

Meanwhile in England, the distinctions drawn by Gilchrist and Huxham between the slow nervous fever and the malignant fever of the hospital were not lost sight of, and were exciting some discussion. Dr. Vaughan of Leicester, in a letter addressed to Dr. Lettsom, speaks of the *febris nervosa* as 'a very different disease to the *febris carcerum*, in its attack, progress, termination, and cure,' and blames Cullen for not distinguishing them;^k and Dr. Erasmus Darwin of Derby, in another letter addressed to Dr. Lettsom, in 1787, proposes as a question for discussion at the Medical Society: 'Whether the nervous fever of Huxham be the same as the petechial or jail fever;^l' while Dr. Willan in 1799 observed that Cullen had 'improperly comprised under the term typhus the slow or nervous fever described by Gilchrist and Huxham, which may rather be considered as a species of hectic, and is not received by infection.'^m The intestinal lesions of the slow nervous fever also began to be noted. They did not escape the notice of John Hunter, as is shown by two preparations in his museum at the Royal College of Surgeons;ⁿ and in 1799, one of Hunter's preparations was figured by Matthew Baillie.^o

There is also evidence that during this century, enteric fever was not unknown in Ireland. Rutty makes frequent mention of a continued fever in Dublin, which prevailed for the most part in autumn, was protracted to three or four weeks or upwards, and was accompanied by diarrhoea and hæmorrhages.^p Dr. Macbride of Dublin, in 1772, spoke of the *febris nervosa* (a protracted fever, attended by diarrhoea) as a different species from the *putrid continual fever*, which was contagious and accompanied by a florid eruption, gradually passing into petechiæ.^q Lastly, Dr. Sims, in his account of the epidemic of

^j ROEDERER and WAGLER, 1762, pp. 4, 8, 19, 179.

^k *Life of Dr. Lettsom*, by Pettigrew, iii. 161-2.

^l *Ibid.* iii. 118.

^m WILLAN, 1801, p. 231.

ⁿ *Pathol. Catal.* Nos. 1214 and 1219.

^o *Plates of Morbid Anatomy*, fasc. 4, pl. ii. fig. 3. Dr. William Stark of London has often been referred to, as the first to localize the lesions of enteric fever in the intestinal glands; but his drawings, and still more the clinical account of the cases from which they were taken, leave no doubt in my mind that the disease which he described was not enteric fever. STARK'S *Works*, 4to. Lond. 1788, pp. 5, 7.

^p RUTTY, 1770, pp. 51, 181, 187, 202, 250, &c.

^q MACBRIDE, 1772, p. 336.

typhus in Tyrone in 1771, remarked that it was different from the nervous fever of Gilchrist and Huxham, although he believed that nervous fever, in its advanced stage, might degenerate into malignant hospital fever, so that it was impossible to distinguish them.*

With the commencement of the present century, the pathological anatomy of fever began to be carefully investigated in France. M. Prost of Paris, in 1804, announced that 'les fièvres muqueuses, gastriques, ataxiques, adynamiques, ont leur siège dans la membrane muqueuse des intestins' (vol. i. p. 23). He stated that he had dissected the bodies of upwards of 200 patients who had died of fever in Paris, and that he had invariably found the intestines inflamed (p. 56); and he added, what is now known to be erroneous, that this inflammation was always in proportion to the severity of the delirium and other febrile symptoms (p. 57). Prost erred in mistaking every *post-mortem* redness of the intestinal canal for inflammation; and although he described correctly the ulcerations peculiar to enteric fever, he regarded them as merely the ultimate stage of ordinary inflammation, and was unacquainted with the peculiar seat and nature of the disease. Of the 113 *post-mortem* examinations of different diseases recorded in his work, 16 only appear to have been well-marked examples of enteric fever.†

Broussais did little more than extend the views advocated by Prost. He was aware that the ulcerations found in fever frequently had their seat in the intestinal glands, but he thought it useless to distinguish between this form and inflammations of other portions of the intestine. So little did Broussais appreciate the nature of the lesions of enteric fever, that in describing this disease as the type of his 'gastro-entérite,' he maintained that in variola, measles, and scarlet fever, death was due to the same 'gastro-entérite.' Believing that the symptoms were the result of inflammation, Broussais was the advocate of copious depletion, and his writings have more or less influenced the practice of many continental physicians to the present day.‡ In 1813 enteric fever was described with far greater accuracy and precision by Messrs. Petit and Serres, under the designation of '*Fièvre entéro-mésentérique.*' These observers pointed out that the lesions were limited to the lower portion of the ileum, and that thus the disease differed from ordinary enteritis. They were the first to regard it as specific. They expressed the opinion that the morbid appearances in the intestine resulted from the introduction of a poison into the system, and that they were of an eruptive nature, like the pustules of variola. Still, they believed that the abdominal lesions preceded, and were the cause of, the pyrexia, and that the extent of the former determined the severity of the latter. They also failed clearly to localize the disease in the solitary and agminated glands.¶

After this, Cruveilhier,¶ Lerminier, and Andral^w described the

* SIMS, 1773.

† PROST, 1804.

‡ BROUSSAIS, 1816 and 1823.

¶ PETIT and SERRES, 1813, pp. 159, 165, and introd. pp. 20, 39.

¶ CRUVEILHIER, 1816.

^w LERMINIER and ANDRAL, 1823, i. 403.



intestinal lesion as an internal exanthem, the ulcerations as preceded by 'pustules,' and the larger patches as an '*anthrax de la membrane muqueuse*.' Andral, moreover, maintained that there was nothing to show that the disease commenced in the mucous follicles, and he classified Continued Fever under diseases of the abdomen.*

It was reserved for Bretonneau of Tours to prove that the disease was always localized in the solitary and agminated glands of the ileum. He also was the first to maintain that it depended on the action of a poison, which was communicable from the sick to the healthy. Although he considered the disease of the intestinal glands as inflammatory, and accordingly named the affection '*dothiéntérie*' or '*dothiéntérite*' (δοθιῆρ, a tumour, and ἔντερον, intestine), he distinguished this inflammation from all other inflammations of the bowel; he showed that there was no correspondence between the severity of the febrile symptoms and the extent of the intestinal lesion; and, like Petit and Serres, he insisted on the analogy of the latter to the cutaneous eruptions of the exanthemata. Bretonneau's views were made known in Paris in 1820, but were first published by his pupils Landini and Trousseau in 1826, and by himself in 1829.† In 1829 was published the first edition of the elaborate and philosophic work of M. Louis.‡ Its appearance constituted an important epoch in the history of continued fevers, as the work furnished a standard of comparison with other fevers. Louis gave to the disease the unfortunate appellation of *Fièvre typhoïde*, which was adopted by Chomel in his 'Clinical Lectures' published in 1834,^a and since then has come into general use. By the works of Louis and Chomel it was shown that disease of the solitary and agminated glands of the ileum was always present in the fever of Paris; both authors, however, agreed that the severity of the fever did not correspond with the extent of the local disorder, and they described cases of *latent* typhoid, where the symptoms were extremely mild up to the date of fatal perforation. They also insisted on the necessity of not confounding typhoid fever with *gastro-entérite*. (C)

All these French observers, however, regarded the contagious typhus of camps and armies and of English writers, as identical with the disease under their own observations. Broussais remarked: 'En effet, puisque le mot typhus est synonyme du mot gastro-entérite, chaque fois que l'on dira typhus des prisons, typhus des hôpitaux, typhus d'Amérique, typhus de Levant, ce sera, comme si l'on disait gastro-entérite des prisons, des hôpitaux,' etc. Louis, Bretonneau, and Chomel were all inclined to regard the two affections as identical, although the two last deplored the absence of careful *post-mortem* records of typhus cases, which, they thought, could alone decide the question. Chomel, after expressing doubts as to the contagious nature of 'typhoid fever,' remarked: '*Si des observations ultérieures démontraient dans le typhus des lésions anatomiques semblables à*

* Ib. 2nd ed. 1834. † LANDINI, 1826; TROUSSEAU, 1826; BRETONNEAU, 1829.

‡ LOUIS, 1829.

^a CHOMEL, 1834.

celles que l'on rencontre dans la maladie typhoïde, l'identité de ces deux affections serait mise hors de doute, et la question de la contagion serait jugée.'

But, while French pathologists were thus maintaining that continued fever was always associated with disease of the intestinal and mesenteric glands, British observers were making the discovery, that in most fatal cases of fever these parts were healthy. At the same time, observations similar to those made in France were not wanting in Great Britain and Ireland. In 1806 Dr. Thomas Sutton published an account of a '*remittent fever*' among the troops at Deal, which was accompanied by great sickness and diarrhoea, while after death the bowels were found to be inflamed and gangrenous.^b Willan and Bateman, in their Reports on the Diseases of London between the years 1796 and 1816, make frequent mention of the same fever as prevailing more particularly in autumn.^c Many of the cases bled so largely by Mills in Dublin in 1812 (see p. 41) were evidently examples of the same fever.^d To Dr. James Muir we are indebted for an excellent history of a limited outbreak of enteric fever in the suburbs of Paisley in 1811;^e and to Mr. Henry Edmonstone, for an equally lucid account of an outbreak at Newcastle in the autumn of 1817.^f Mr. Edmonstone's account is particularly interesting, as it forms a striking contrast to the descriptions of typhus then prevailing in many other parts of the United Kingdom, and which afterwards visited Newcastle itself. The outbreak commenced in June during extremely hot weather following much rain, and lasted only six weeks. It was believed not to be contagious, and several members of a family were observed to be attacked simultaneously. Many of the first cases occurred in the higher ranks of life and among servants in the best ventilated parts of the town, and it was scarcely known in those parts of the town where the infectious typhus was most common among the poor. Children and persons in the vigour of life were almost exclusively affected. Its duration was from 14 days to a month. Among the symptoms were vomiting, purging, melæna, epistaxis: cerebral symptoms were rare. Abercrombie, in 1820, recorded two cases of '*enteromesenteric fever*,' in which the characteristic lesions of enteric fever were found after death, and stated that the so-called '*remittent fever*' of infants was often symptomatic of intestinal disease.^g In 1826, Dr. Hewett of St. George's Hospital published a number of cases, proving the frequent occurrence of '*follicular ulceration*' of the bowels in the idiopathic fever of London. Dr. Hewett's investigations have met with unmerited neglect. They were published almost simultaneously with those of Bretonneau; and, like his, they showed that the seat of the lesion was 'in the solitary and agminated glands of the ileum. According to Dr. Hewett, the orifices of these glands became plugged up, and the glands themselves distended with secretion, while the

^b SUTTON, 1806.

^d MILLS, 1813.

^f EDMONSTONE, 1818.

^c WILLAN, 1801, p. 25; BATEMAN, 1819, p. 145, etc.

^e MUIR, 1811.

^g ABERCROMBIE, 1820.



surrounding tissues became disorganized partly by ulceration and partly by sloughing.^h In 1827 Bright published his observations on fever in London, illustrated by excellent coloured drawings of the intestinal disease, which he spoke of as occurring occasionally.ⁱ In the same year, Dr. Alison stated that he had met with the intestinal affection described by French authors in Edinburgh; but he maintained that it was not found after death from the ordinary typhus of that city; in 25 autopsies he had found Peyer's glands healthy.^j In 1830, Dr. Tweedie^k and Dr. Southwood Smith,^l the two physicians of the London Fever Hospital, published the results of their experience. Both authors recorded a number of cases of fever in which the intestines were found ulcerated and the mesenteric glands enlarged after death, and other cases where these parts were healthy: both regarded the intestinal lesion as merely one of many other complications of fever. A few years later (1834-7), Craigie confirmed Alison's observation to the effect that, in the fever of Edinburgh, intestinal disease occasionally 'coexisted with the fever and determined the fatal termination,' but that in most cases the intestines were healthy.^m Lastly, although Irish observers ascertained that intestinal disease was exceptional in the fever of their own country; yet, in 1833 Dr. Cheyne described the symptoms and lesions of the fever of France under the appellation of '*epidemic gastric fever*,' and stated that he had frequently observed it in Dublin;ⁿ and, in the following year, Mr. Poole adopted Cheyne's appellation in his account of two outbreaks of the disease in different parts of Ireland.^o

Thus the French pathologists rarely failed to find the intestines diseased in fever: the English, on the contrary, in most cases found them healthy, and believing, either that the primary seat of fever was in the brain, or that fever was an idiopathic or essential affection, regarded the intestinal lesion as an accidental complication. In both countries, among the first effects of the increased study of morbid anatomy, was the neglect of the distinctions drawn in the previous century between the slow nervous fever and the malignant fever of armies and jails.

Somewhat clearer views on the subject prevailed in Germany. In 1810, Hildenbrand distinguished between the *contagious typhus* and the *non-contagious nervous fever*;^p and soon afterwards many German writers regarded the *Typhus exanthematicus* and the *Typhus abdominalis*, *Typhus gangliaris*, or *Nervenfieber*, as well-marked varieties.^q The distinctions, however, which they laid down were not sufficient to ensure accuracy in diagnosis, still less to establish the non-identity of the diseases in question, while in 1844 Dr. Kuchler published a memoir to prove that the two diseases were identical.^r

^h HEWETT, 1826.ⁱ BRIGHT, 1827.^j ALISON, 1827.^k TWEEDIE, 1830.^l SMITH, 1830.^m CRAIGIE, 1834, and 1837.ⁿ CHEYNE, 1833.^o POOLE, 1834.^p HILDENBRAND, 1811, p. 15.^q REUSS, 1814; AUTENRIETH, 1822; STANNIUS, 1835; EBEL and GROSSHEIM, 1836; SCHÖNLEIN, 1839.^r See GRISOLLE, *Path. Int.* 1852, i. 53.

But the investigation of the question was soon to be renewed, and to be crowned with results, which even Erasmus Darwin could little have anticipated. A record of the successive steps by which our present knowledge has been attained is an important chapter in the history of Medicine.

Early in 1835, Dr. Peebles, who had observed the rubeoloid eruption in the contagious typhus of Italy, pointed it out to Dr. Perry in the Glasgow Hospital. Dr. A. P. Stewart was present on the occasion, and from that date the eruption, which seems to have been previously overlooked in Glasgow,^s was noted in the majority of cases. In January 1836 Dr. Perry published a paper, in which he correctly described many of the distinctions between typhus and enteric fever.^t He referred to the complete absence of the 'typhus eruption' in 'doth^hinenteritis,' but did not state that the latter was characterized by an eruption of its own, although, four years later, Dr. Stewart remarked that Dr. Perry was the first, whom he had heard maintain the complete difference of the two eruptions.^u The following extract, however, from Dr. Perry's memoir, shows that his ideas on the subject were far from clear, and that he believed the existence of intestinal lesion to be not incompatible with true typhus:—'*Doth^hinenteritis*, or enlargement of the mucous follicles of the smaller intestines and enlargement and ulceration of the aggregated glands of the lower third of the ileum, occurs in combination with contagious typhus, and is to be met with in about six of those who die from typhus. It also exists as a disease *per se*.'

In the same year (1836), Dr. H. C. Lombard of Geneva, who had previously had ample experience of enteric fever in Switzerland and France, visited various towns in England, Scotland, and Ireland. In certain cases of fever in Glasgow and Dublin, which he had considered similar to the fever of the Continent, he was astonished to find no disease of Peyer's glands. After further investigations in Liverpool, Manchester, Birmingham, and London, he was the first to state that there were 'two distinct and separate fevers in Great Britain; one of them identical with the contagious typhus, the other a sporadic disease, identical with the typhoid fever, or *doth^hinenteritis*, of the French.' He did not, however, determine the differences between the eruptions and the symptoms of the two fevers.^v Almost at the same time, Messrs. Gerhard and Pennock of Philadelphia were arriving at the same conclusions from observations of an epidemic of typhus, which prevailed in that city in the spring and summer of 1836. Both had previously studied enteric fever in Paris and were familiar with it in their own country. They at once recognized the difference of the new disease, and after a time they were never deceived in their diagnosis. Their observations were published by Gerhard in February and August, 1837. Gerhard maintained that the typhus of Philadelphia was identical with British typhus, and with the jail, camp, ship, petechial, or spotted

^s See *antea*, p. 46. ^t PERRY, 1836 (1). ^u STEWART, 1840. ^v LOMBARD, 1836.

fever, and that it was eminently contagious; while, on the other hand, enteric fever was rarely communicated. He showed that the lesions of Peyer's patches and of the mesenteric glands, invariably present in the latter, were never found in the former, and remarked that English observers erred in regarding the intestinal disease as a mere complication of typhus. He insisted on the 'marked difference between the petechial eruption of typhus and the rose-coloured spots of typhoid fever;' and he showed that a peculiar train of symptoms, very different from those of typhus, were associated with the intestinal affection, and that 'the distinctive characters of the two diseases were such as in practice could not allow them to be confounded.'^w To Messrs. Gerhard and Pennock certainly belongs the credit of first clearly establishing the most important points of distinction between the two diseases. M. Valleix of Paris, in a review published in January and February 1839, thus alluded to Gerhard's observations: 'M. Gerhard établit d'abord un fait bien important, c'est qu'il peut exister, et qu'il existe en effet, concurremment dans le même pays, deux maladies, qu'on peut parfaitement diagnostiquer, et dans lesquelles on peut prédire, pendant la vie du malade, les lésions qui seront trouvées après la mort: ce sont, la fièvre typhoïde, et le typhus proprement dit.'^x

In 1837 the Académie de Médecine of Paris awarded prizes to the authors of two essays on the 'Analogies and Differences of Typhus and Typhoid Fever.' These essays did not contain original observations, but referred chiefly to the previous records of the two diseases. One author (Gaultier de Claubry^y) expressed his conviction that the two diseases were identical; the other (Montault^z) arrived at the conclusion that, notwithstanding certain resemblances in their symptoms, they were really distinct. It may be remarked that De Claubry, like some recent writers, although believing the two fevers to be identical, argued from the statements of previous observers as if they had always employed the terms 'typhus' and 'typhoid' with strict accuracy. It was not surprising, then, that he maintained that intestinal lesions might exist in true typhus. It was De Claubry's memoir, however, that mostly influenced public opinion in France.

In 1838 Dr. Staberoh of Berlin, after studying fever for four or five years in Vienna and Paris, and for six months in Britain, pointed out to the hospital physicians of Glasgow the different eruptions met with in Continued Fevers, and remarked that these distinctions would facilitate the decision of the question of the specific difference of *typhus abdominalis* and *typhus exanthematicus*.^a

In February 1839, Dr. Shattuck of Boston U.S. came over from Paris, where he had already studied enteric fever, and watched some cases at the London Fever Hospital. He wrote an account of thirteen cases, which he communicated to the Medical Society of Observation of Paris. About one-half of Dr. Shattuck's cases appear to have been typhus; the other half were enteric. Dr. Shattuck strongly insisted

^w GERHARD, 1837, xx. 289, 291, etc.

^y DE CLAUBRY, 1838. ^z MONTAULT, 1838.

^x VALLEIX, 1839 (No. 1).

^a STABEROH, 1838, p. 427.

on the existence of two fevers in England, and pointed out with considerable minuteness the distinctions between them.^b His paper formed the ground-work for a second review on fever, published by M. Valleix in October 1839, in which the conclusions were arrived at, that both typhus and *fièvre typhoïde* were to be met with in England, that the latter was the same as the fever of France, and that English practitioners erred in confounding them.^c

In February 1840 M. Rochoux published a memoir, in which he endeavoured to show that the 'dothiésentérie' of Bretonneau differed from typhus in its anatomical lesions, symptoms, and causes. He insisted that nothing could be more unlike than the eruptions of the two fevers, and that while typhus was highly contagious and generally believed to result from over-crowding, the contagious character of dothiënteritis was doubtful and it was independent of over-crowding.^d

On the 6th of the same month (February 1840) Dr. H. C. Barlow read a paper 'On the Distinction between Typhus Fever and Dothiésentérie' before the Parisian Medical Society, which was published in abstract in 'The Lancet' for February 29th. This paper has received less attention from subsequent writers than it deserves. Dr. Barlow maintained that typhus was an epidemic and highly contagious disease, and was usually most prevalent in winter; whereas dothiésentérie was an endemic disease, but slightly, if at all, contagious, and always most prevalent in summer and autumn along with other abdominal affections. Although typhoid symptoms were common to both fevers as well as to other diseases, he showed that their clinical history and duration were entirely different. He carefully distinguished between the rose-coloured lenticular spots of the one disease and the petechial eruption of the other, and he insisted that the lesions of dothiésentérie were never present in typhus. 'Surely,' he says, in conclusion, 'two diseases which differ in all these particulars cannot be identical.'^e

Dr. A. P. Stewart (now of London) studied fever in the Glasgow Fever Hospital from the summer of 1836 to June 1838, and afterwards in Paris. The results of his researches were communicated to the Parisian Medical Society on the 16th and 23rd of April 1840, and were published in October of the same year. Dr. Stewart described in a masterly manner the leading distinctions between 'typhus' and 'typhoid' fevers, as regards their origin, proximate causes, course, symptoms, and anatomical lesions; and he supported his views by a statistical analysis of cases of both fevers. He pointed out more accurately than any previous observer the differences of the eruptions; and he remarked that the characters of the two diseases, when taken collectively, were 'so marked as to defy misconception, and to enable the observer to form, with the utmost precision, the diagnosis of the nature of the disease and the lesions to be revealed by dissection.' He showed that, while there was overwhelming evidence to prove that the effluvia from living bodies in close and unventilated localities could

^b SHATTUCK, 1839.

^d ROCHOUX, 1840.

^c VALLEIX, 1839 (No. 2).

• BARLOW, 1840.

generate the poison of typhus, 'typhoid fever' often appeared in country places and in the best aired houses. The facts and arguments adduced in his memoir forced upon him the conviction that the two fevers were 'totally different diseases.'^f In November 1840 a review of Dr. Stewart's memoir appeared in the 'Archives Générales de Médecine,' which the writer ended by remarking, that Dr. Stewart's observations demonstrated that in England there were two distinct diseases—'typhus,' and 'typhoid fever.'

In consequence of the various researches now mentioned, Louis, in the second edition of his great work on 'Fièvre typhoïde,' published in 1841, admitted that 'le typhus fever des Anglais est nécessairement une maladie très-différente de celle qui nous occupe ;' and he added, that although difficulties in diagnosis might occasionally arise, such difficulties were encountered in the diagnosis of the best-known diseases, and in no way detracted from the specific non-identity of the two fevers in question.^g Bartlett, also, in the first edition of his work on American Fevers, treated them as distinct diseases.^h In 1846, Dr. Ritchie of Glasgow accurately described the various circumstances in which the two fevers agreed and differed;ⁱ and since 1846, the cases of each fever admitted into the Glasgow Royal Infirmary have been carefully distinguished. In the following year (1847) Dr. H. Gueneau de Mussy came over from Paris to Dublin, and after studying typhus, which was then so prevalent in that city, was convinced of its specific distinctness from the fever of Paris. On his return to Paris, his arguments induced M. Grisolle to adopt the same view.^j Dr. De Mussy observed one case in Dublin where a patient died of typhus contracted during convalescence from enteric fever; the cicatrices of the intestinal ulcers were discovered after death.

The doctrine of non-identity, however, did not remain unopposed. In a careful review of the subject, published in July and October 1841, the writer,^k with all the evidence before him, regarded the two fevers as varieties, but not distinct species. Dr. Davidson, in the Thackeray Prize Essay on Fever (1840), came to the same conclusion.^l In June 1845 De Claubry reiterated to the French Academy of Medicine his belief in identity, although in the subsequent discussion he was strongly opposed by Rochoux. Dr. Waters, also, in his inaugural Prize Thesis, presented to the Medical Faculty of the University of Edinburgh in 1847, stated that the conclusion was inevitable, that the two fevers were identical.^m Indeed, notwithstanding the decided opinions expressed by the several observers above-mentioned, it was the general impression, both in England and France, that the evidence adduced was insufficient to establish the specific non-identity of the two fevers, and the opposite doctrine continued to be taught in most medical schools.

^f STEWART, 1840 and 1858.

^g LOUIS, 1841, ii. 318, 324.

^h BARTLETT, 1842.

ⁱ RITCHIE, 1846.

^j GRISOLLE, *Path. Int.*, 1852, i. 55.

^k See *Bibliogr.*, 1841, *Review*.

^l DAVIDSON, 1841.

^m WATERS, 1847 (not published).

Much of the remaining doubt, however, was removed by the researches of Sir W. Jenner, published between 1849 and 1851. Jenner confirmed and amplified the distinctions between the symptoms of the two diseases previously drawn by Gerhard, Stewart, and others, and did much to facilitate their diagnosis. He supported his statements by carefully-recorded cases, and by an elaborate analysis of the symptoms and *post-mortem* appearances of numerous cases of both fevers observed by him at the London Fever Hospital. But the most important part of his investigations bearing on the question at issue, was that which demonstrated the dependence of the two fevers on distinct causes. By an analysis of all the cases admitted into the London Fever Hospital during more than two years, he showed that the two fevers did not prevail together, and that the one did not communicate the other. He also adduced cases to prove that an attack of the one fever protected from subsequent attacks of itself, but not of the other. Jenner maintained that typhus and the so-called 'typhoid fever' were as distinct as any two of the exanthemata.^a

During the last ~~ten~~ years, many physicians enjoying independent spheres of observation have arrived at the same conclusions as Gerhard, Stewart, and Jenner. Among our own countrymen may be mentioned Dr. Peacock^o of St. Thomas's Hospital, Dr. Wilks^p of Guy's Hospital, Sir Thomas Watson^q and Dr. Tweedie,^r Dr. W. T. Gairdner^s and Dr. Anderson^t of Glasgow, and D. A. Hudson^u and Dr. Lyons^v of Dublin. In an essay, presented to the Medical and Chirurgical Society of London in 1858, I endeavoured to show that the causes of the two fevers were very different.^w In America, the non-identity of the two fevers has been advocated by Bartlett,^x Austin Flint,^y and Wood,^z and is generally recognized. Many continental physicians also, who have lately had an opportunity of studying typhus, have expressed their conviction of its distinctness from the enteric fever, with which they had been more familiar previously. In 1854, Forget communicated to the French Academy of Sciences the report of an epidemic of typhus in the jail of Strasbourg. Although in his work on 'Entérite Folliculeuse,' published in 1841, he had expressed his belief that the diseases were identical, his first experience of true typhus led him to an opposite conclusion, and in the memoir referred to, he uses the following words:— 'J'expose une série d'observations avec autopsie, qui démontrent l'absence de l'entérite folliculeuse dans le typhus. Comme corollaire des faits précédents, j'établis un parallèle entre les deux maladies, d'où résulte qu'elles diffèrent non-seulement par les caractères anatomiques, mais encore par les causes, les symptômes, la marche, la durée et le traitement.'^a The French physicians, who met with typhus during the Crimean war, adopted the doctrine of non-identity almost without

^a JENNER, 1849, 1850 and 1853.

^p WILKS, 1855 and 1856.

^q WATSON, *Lectures on Physic*, 4th ed. 1857, vol. ii.

^r TWEEDIE, 1860. ^s W. T. GAIRDNER, 1860 and 1862 (2). ^t ANDERSON, 1861.

^u HUDSON, 1867.

^v LYONS, 1861.

^w MURCHISON, 1858.

^x BARTLETT, 1856.

^y FLINT, 1852.

^z WOOD, *Treatise on the Practice of Medicine*, 4th ed. 1855.

^a FORGET, 1854.

exception. Two of them may be referred to, by way of illustration. In 1856 Godélier communicated to the French Academy an excellent report of sixty-three cases of typhus observed at the Hospital of Val-de-Grâce. He maintained that British typhus was identical with the typhus of prisons and armies, but differed entirely from the *fièvre typhoïde* in its mode of origin, symptoms, and anatomical lesions. 'Le typhus et le *typhus fever* sont identiques; ils diffèrent spécifiquement de la *fièvre typhoïde*.'^b Jacquot summed up the evidence on the question as follows:—'En un mot, chaque espèce, typhus et fièvre typhoïde, présente tous les degrés d'intensité, sans cesser de garder son individualité, ses caractères, sa marche, ses symptômes, ses lésions.'^c Again, M. Barrallier, in his account of an epidemic of typhus at Toulon, enters minutely into the question of its distinctness from the ordinary fever of France, and remarks:—'Elles sont séparées l'une de l'autre par leurs causes, leurs symptômes, leur marche, leur durée, leurs caractères anatomiques; elles appartiennent réellement à la même classe de maladies, les fièvres essentielles spécifiques, mais elles constituent des genres à part, comme la rougeole et la scarlatine dans le groupe des fièvres éruptives.'^d

Many German physicians, among whom may be mentioned Griesinger,^e Hirsch, and Zuelzer, have adopted the same view.

The specific distinctness of the two diseases is now in fact generally recognized in every part of the world. It is true that some excellent observers still adhere to the doctrine of identity,^f and maintain that it is impossible to distinguish the symptoms or lesions of the two fevers, and that indeed the dothiententeritis of Bretonneau is merely an accidental complication of typhus. Looking at the past history of medicine, it would be surprising were it otherwise. The arguments on both sides of the question will be discussed in a subsequent chapter.

SECTION IV.—GEOGRAPHICAL RANGE.

Enteric fever has been known to occur in every part of the world.

It is endemic in the British Isles, but is apparently most common in England, more common in Ireland than in Scotland, and in Scotland more common on the west than on the east coast. Of 4,565 cases of enteric fever admitted into the London Fever Hospital during twenty years, (1848–1867), the birth-place was noted in 3,887 as follows:—

^b GODÉLIER, 1856, p. 896.

^d BARRALLIER, 1861, p. 129.

^c JACQUOT, 1858, p. 307.

^e GRIESINGER, 1864.

^f CHRISTISON, 1858; STOKES, 1854; KENNEDY, 1860 and 1862; J. BELL, 1860; HUSS, 1855; YATES, 1857; CHAMBERS, 1858; BARCLAY, *On Med. Diagnosis*, 1859; BARLOW, *Man. of Pract. of Med.* 1856; J. H. BENNETT, *Clinical Lectures*, 1865.

TABLE XXXVIII.

Natives of London,	.	.	.	2,422, or 62·31 per cent.
„ of rest of England,	.	.	.	1,175, „ 30·23 „
„ of Scotland,	.	.	.	24, „ 62 „
„ of Ireland,	.	.	.	225, „ 5·79 „
„ of rest of World,	.	.	.	41, „ 1·05 „

Total 3,887 100·00

Taking the census of 1861 (see page 57) as a basis of information concerning the birth-place of all the inhabitants of London, it follows that during the period above mentioned there were admitted into the London Fever Hospital

1	in every	475	of the Irish inhabitants.
1	„	721	of the English inhabitants.
1	„	1,488	of the Scotch inhabitants.
1	„	1,637	of Foreigners.

The contrast here presented with typhus and relapsing fever will be seen by referring to pages 57 and 319. The experience of the London Fever Hospital furnishes no evidence of enteric fever having been at any time imported into London from Ireland or elsewhere.

Medical literature abounds with records showing enteric fever to be endemic in France, Germany, Russia, Spain, Italy, and Turkey. Many of them are referred to in this work; others are quoted by Hirsch.^c The occurrence of enteric fever in Norway and Sweden has been demonstrated by Huss,^b Conradi,ⁱ etc., and in Iceland by Schleisner^j and Hjaltelin.

There can be no doubt that enteric fever is met with in the tropics, where it has probably been often mistaken for remittent fever. In India, it is far from uncommon. Annesley^k and Twining^l long ago pointed out, that a fever often prevailed in Bengal, which proved fatal under typhoid symptoms, and in which the small intestines were found ulcerated after death. Similar observations were made in Madras by Mouat and Shanks,^m while the recent researches of Scriven,ⁿ Ewart,^o Edward Goodeve,^p Cornish,^q Ranking,^r Peet,^s and Morehead^t leave no doubt on the matter. These gentlemen have recorded

^c HIRSCH, 1859. ^b HUSS, 1855. ⁱ HIRSCH, 1859, p. 158. ^j SCHLEISNER, 1850; *Hjal*
^k ANNESLEY, *Dissease of India*, p. 547. ^l TWINING, *Dissease of Bengal*, 1832, p. 13.
^m HIRSCH, 1859, p. 161. ⁿ SCRIVEN, 1854 and 1857. ^o EWART, 1856.
^p GOODEVE, 1859. ^q CORNISH, 1862. ^r RANKING, 1862. ^s PEET, 1862.
^t MOREHEAD, *Researches on Disease in India* 2nd ed. 186. 160.

o, p.

numerous cases of fever occurring in various parts of the Bengal, Madras, and Bombay Presidencies, and in Burmah, which, in their symptoms (including the eruption) and *post-mortem* appearances, agreed in every respect with the so-called 'typhoid fever' of French and English writers. Indeed, according to Dr. J. L. Bryden, enteric fever is the one disease of India by which the young soldier dies." Heymann has frequently observed it in Sumatra and Java,^v and it has also been shown to prevail in Syria.^w

In Africa it is not wanting. Haspel,^x Cambay,^y and other French writers have observed it in Algeria. Griesinger^z mentions it as occurring in Egypt; and Oelsner, in the Isle of Bourbon.^a It is probably not uncommon on the West Coast of Africa. M'William, in his account of the Niger Expedition,^b records the *post-mortem* appearances of several cases of fever, as follows:—"The jejunum was free from disease, and likewise the ileum until within three feet of its lower end, where were observed softening of the mucous lining generally and livid spots. A series of small ulcerations were seen in 4 cases. In one the membrane was thickened and rough and the ulceration had nearly perforated the bowel. The agminated glands of Peyer were distinct and enlarged in 4 cases. The morbid appearances observed in the intestines are very like those so often found in fatal cases of the 'typhoid fever of this country.' Again, in the Museum of Fort Pitt, there is a drawing showing the condition of the intestines in a case which proved fatal at Sierra Leone, and which was believed to be yellow fever, but which was probably enteric fever complicated with jaundice."^c

In North America, enteric fever is endemic from Greenland to Gulf of Mexico. The writings of Gerhard,^d Bartlett,^e Flint,^f Jackson,^g and Wood,^h are often referred to in this work, and many other references have been collected by Hirsch. Martinez del Rio,ⁱ Jecker,ⁱ Newton,^j Stricker,^j and Gibbs^j have described a fever as prevailing in Mexico, which presented all the symptoms and anatomical lesions of enteric fever; while Lidel^k and Praslow^k have reported its occurrence in Central America and California, and W. H. Stone has observed it in the West

^u *Eighth An. Rep. of San. Com. of Gov. of India for 1871.*

^v SCHMIDT'S *Jahrb.* Bd. lii. 96.

^w HIRSCH, 1859, p. 160.

^x HASPEL, 1850. ^y CAMBAY, 1854. ^z GRIESINGER, 1853. ^a HIRSCH, 1859, p. 162.

^b LONDON, 1843, p. 144. ^c JENNER, 1853, p. 312.

^d GERHARD, 1837.

^e BARTLETT, 1842 and 1856.

^f FLINT, 1852.

^g JACKSON, 1838.

^h WOOD, *Treat. on Pract. of Med.* 4th ed. 1855.

ⁱ LOUIS, 1841, vol. i. pref. p. 17.

^j HIRSCH, 1859, p. 164.

^k Ibid.

Indies.¹ According to Tchudi, it is extremely common in Brazil and Peru.^m

Lastly, enteric fever has been observed in Australia, New Zealand, and Van Diemen's Land, by McGillivray,ⁿ Power,^o and Milligan.^p

SECTION V.—ETIOLOGY.

A.—PREDISPOSING CAUSES.

1. *Sex*.—Enteric fever attacks one sex as readily as the other. Of 5,988 cases admitted into the London Fever Hospital during twenty-three years (1848–70), 3,001 were males, and 2,987 were females; or the males exceeded the females by 14. Of 2,312 cases collected by Bartlett from several American sources, 1,179 were males, and 1,163 females; or the males exceeded the females by 16.^q Of 891 cases admitted into the Glasgow Infirmary from 1857 to 1869, 527 were males, and 364 females.^r On the other hand, of 207 cases admitted into the Dundee Royal Infirmary during five years (1864–9) 119 were females and only 88 males.^r The preponderance of one sex in different hospitals is determined by accidental circumstances. Thus of 138 cases observed by Louis in Paris, only 32 were females; but the excess of males was accounted for by the circumstance that a larger number of males were strangers in Paris and could not be treated at their own homes.^s

2. *Age*.—The predisposition to enteric fever is much influenced by age, the disease being chiefly met with in youth and adolescence.

The mean age of 1,772 cases admitted into the London Fever Hospital during ten years (1848–57) was 21·25; that for males being 21·45, and for females, 21·06. These averages are more than five years under those of the entire population. (See page 62.) Table XXXIX. shows the number admitted in each quinquennial period of life, during twenty-three years (1848–70). (See also Diagram XII.)

From this Table it appears that nearly one half (46·55 per cent.) of the cases were between fifteen and twenty-five years

¹ STONE, 1868.

^m HIRSCH, 1859, p. 164.

ⁿ MCGILLIVRAY, 1867.

^o *Dublin Quarterly Journ.*, 1843, xxiii. 91.

^p HIRSCH, 1859, p. 165.

^q BARTLETT, 1856, p. 109. All but 98 of Bartlett's cases were fatal cases.

^r *Hospital Reports*.

^s LOUIS, 1841, ii. 354.

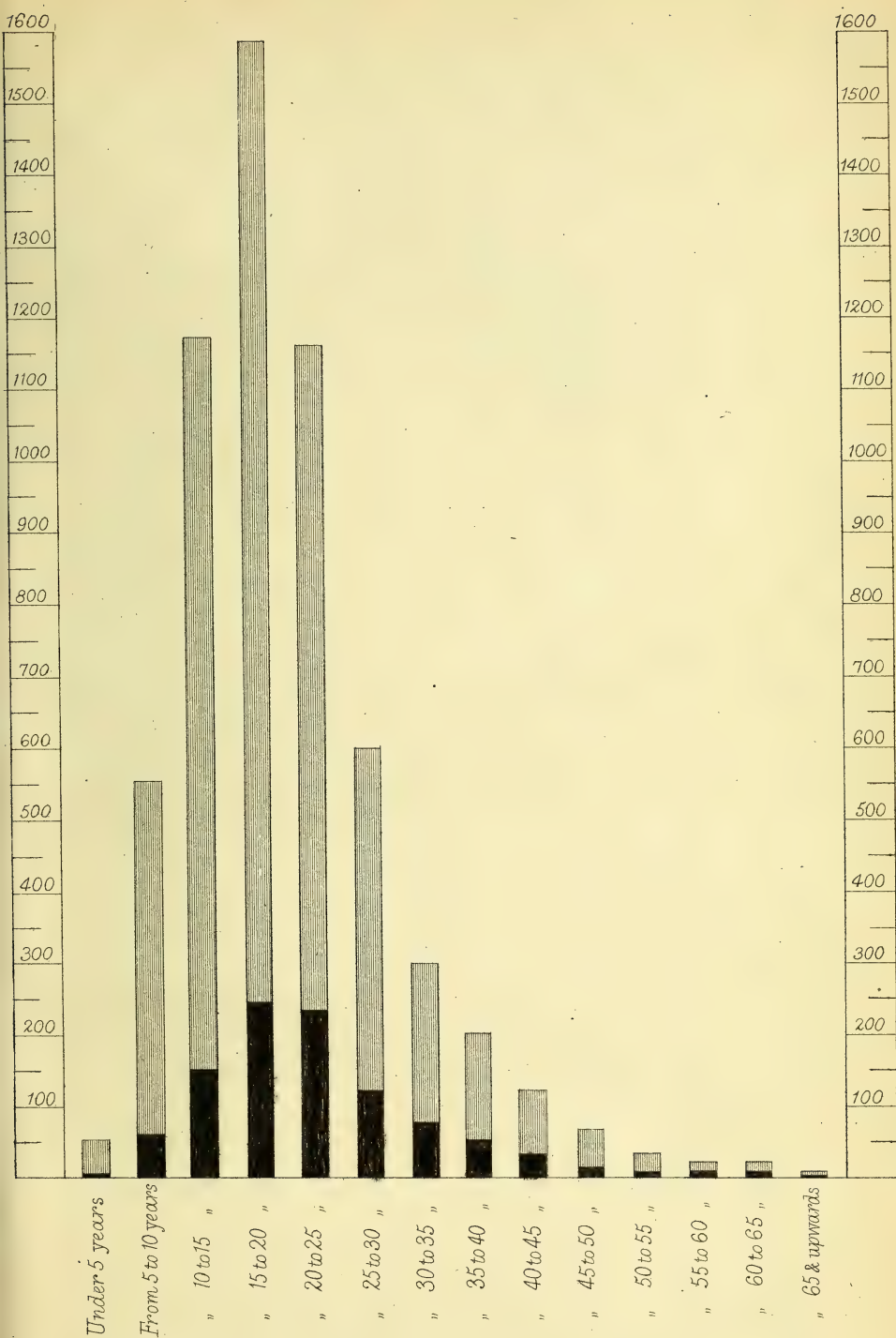


Diagram XII shows the Ages of 5911 cases of Enteric Fever, admitted into the London Fever Hospital, with the number of deaths at each age. (Compare with Diagr. II.)

TABLE XXXIX.

Age	No. of Cases			Percentage at each period of life
	Males	Females	Total	
Under 5 years	24	34	58	98
From 5 to 9 years	331	227	558	9'44
" 10 to 14 "	629	545	1,174	18'16
" 15 to 19 "	744	844	1,588	26'86
" 20 to 24 "	545	619	1,164	19'69
" 25 to 29 "	297	303	600	10'15
" 30 to 34 "	156	141	297	5'36
" 35 to 39 "	96	105	201	3'40
" 40 to 44 "	64	60	124	2'09
" 45 to 49 "	27	37	64	1'08
" 50 to 54 "	13	23	36	'60
" 55 to 59 "	12	8	20	'33
" 60 to 64 "	12	8	20	'33
" 65 to 69 "	3	2	5	'08
" 70 to 74 "	...	...	...	...
" 75 to 79 "	2	...	2	'03
Age not specified	46	31	77	1'30
Total, omitting doubtful cases	2,955	2,956	5,911	99'88

of age, and more than one-fourth (28·58 per cent.) were under fifteen.* Less than one-seventh (13·3 per cent.) were above thirty, and only 1 in 71 exceeded fifty. The entire population of England and Wales in 1861 being 12,4~~44,327~~^{81,323} persons under thirty years of age, and ~~7,644,987~~ above thirty, it follows that persons under thirty are more than four times as liable to enteric fever as persons over thirty. The difference in this respect from typhus is remarkable. (See page 63.) The contrast between the ages of the typhus and enteric cases admitted into the London Fever Hospital is also brought out by the following comparison—

	Per cent of Typhus cases	Per cent of Enteric cases
Under 10 years there were	7'88	10'42
From 10 to 15 years there were	12'06	18'16
" 15 to 25 "	29'39	46'55
" 25 years and upwards	50'66	24'87
" 30 "	41'14	13'30
" 40 "	24'70	4'54
" 50 "	10'68	1'37
" 60 "	3'87	'44

* The proportion of enteric cases in early life would be still greater, were it not that many children labouring under this disease are treated at dispensaries and at their own homes, as cases of 'Infantile Remittent Fever,' and that comparatively few young children are admitted into the Fever Hospital.

The increase in the number of cases between forty and forty-five years of age, observed in typhus and relapsing fever (see pages 64 and 322), did not occur in enteric fever.

There was little difference between the ages of males and females. In some years, the mean age of the males was greater; in others, that of the females; and during ten years, the mean age of the two sexes was, as above stated, almost equal. Of 1,790 cases under fifteen, the males exceeded the females by 178; of 2,752 cases between fifteen and twenty-five, the females exceeded the males by 174; and of 769 cases over thirty, the males exceeded the females by 1; these results are contrary to what was noted in typhus and relapsing fever. The experience of the London Fever Hospital to some extent bears out the statement of West, that enteric fever is much more common in boys than in girls.^u Of 231 cases observed by Barthez and Rilliet^v and Taupin^w 166 were boys, and only 66 girls. On the other hand, of 98 cases reported by Friedleben, 46 were boys and 52 girls.^x

The fact that enteric fever is mainly a disease of young persons has been confirmed by every observer.^y For reasons already stated, cases are more common in infancy and childhood than the returns of the London Fever Hospital might lead one to believe. Of 7,348 cases reported to the French Academy from different parts of France, Gaultier De Claubry ascertained that 2,282, or 31 per cent, had not attained fifteen years of age.^z The youngest case observed at the London Fever Hospital during twenty-three years was that of an infant aged six months, whose intestine was exhibited by me to the Pathological Society.^a Many years ago M. Rufz endeavoured to show that the disease did not occur under four years of age,^b and West states that it is rare under five years.^c There are many instances on record, however, of its occurrence in the third and fourth years of life;^d and cases in the first year of life have been recorded by Abercrombie,^e Rilliet,^f Friedreich,^g Hennig, and Wunderlich.^h M. Charcellay, a

^u *Diseases of Children*, 3rd ed. 1854, p. 561. ^v BARTHEZ and RILLIET, 1853, ii. 714.

^w TAUPIN, 1839. ^x *Brit. and For. Med. Chir. Rev.* July, 1858, p. 161.

^y LOUIS, 1841, ii. 353; CHOMEL, 1834; JENNER, 1850, xxii. 457; BARTLETT, 1856, p. 107; DAVENNE, 1854.

^z GAULTIER DE CLAUBRY, 1849, xiv. 29.

^a *Trans.* xvi. 125.

^b RUFZ, 1840.

^c WEST, *Dis. of Child.* 1854, p. 561.

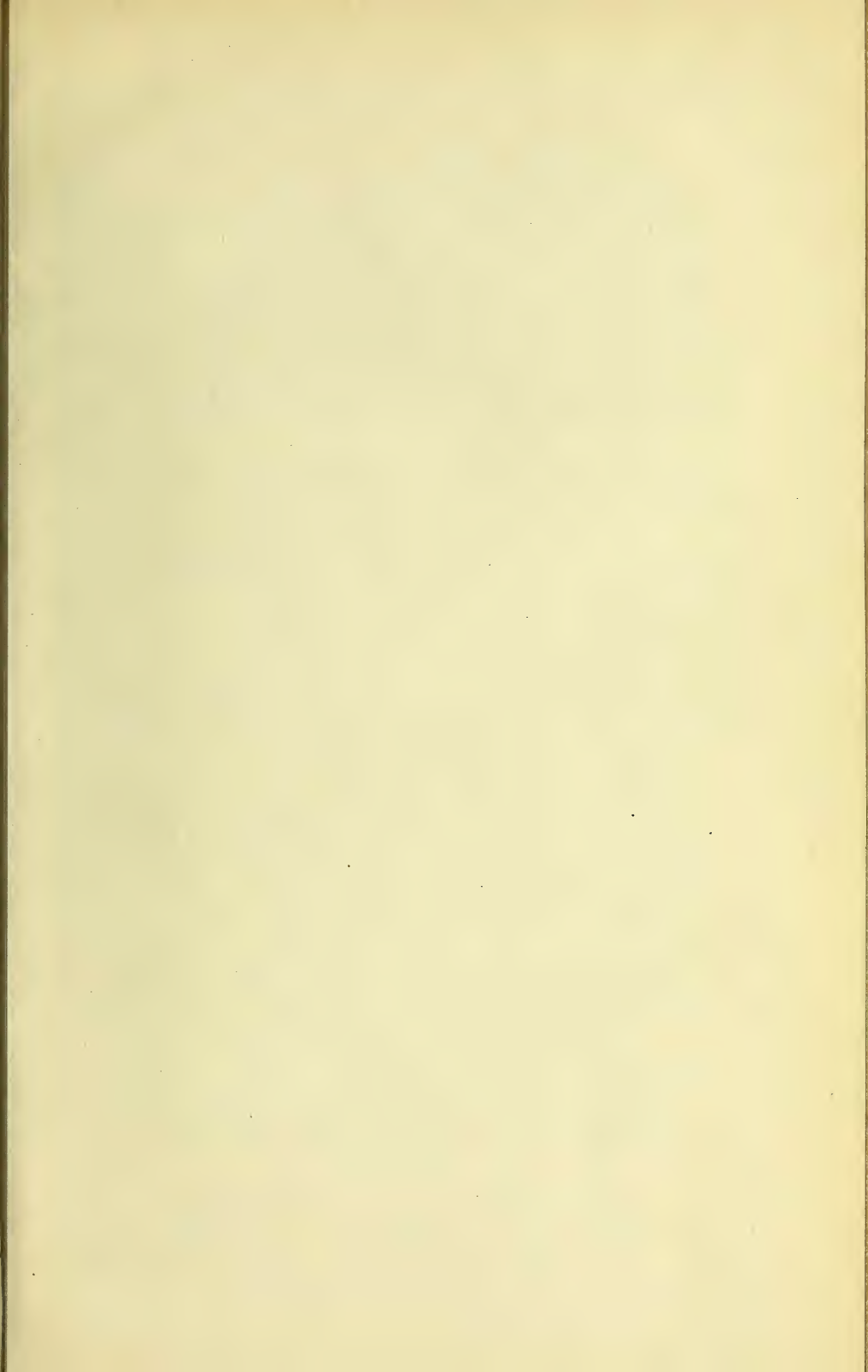
^d RILLIET and BARTHEZ, 1840 and 1853; TAUPIN, 1839.

^e ABERCROMBIE, 1820.

^f RILLIET, 1853, ii. 713-4.

^g FRIEDREICH, 1856.

^h *Brit. and For. Med. Chir. Rev.* July, 1858, p. 161; see also *Gazette Méd.* viii. 717, ix. 781.



colleague of Bretonneau in the hospital at Tours, has published two cases of the disease in newly-born children. One died on the eighth, and the other on the fifteenth, day after birth; in the former, it was inferred both from the symptoms and *post-mortem* appearances, that the disease must have been contracted in the mother's womb, although the mother had not the fever, either during pregnancy, or after delivery.ⁱ About the same time also, Manzini communicated to the Académie des Sciences the account of a dissection of a seven months' fœtus, which died within half an hour after birth, and in which many of Peyer's patches presented appearances similar to those of dothienenteritis; no mention is made of the mother having the fever.^j

On the other hand, youth is not necessary for the development of enteric fever, as Louis was inclined to think.^k Although most observers have noted its rarity above fifty years of age, 83 of 5,911 cases at the London Fever Hospital, or 1·37 per cent., exceeded that age, a proportion which is much larger than at first appears, when it is remembered that ~~less than~~ *only* one-seventh of the entire population of England and Wales is constituted by persons above fifty, and that many who survive that age have perhaps acquired an immunity from the disease by a previous attack. Twenty-seven cases were noted at the Fever Hospital above sixty, and two above seventy-five; in one of the latter I found characteristic 'typhoid ulcers' in the ileum after death. Lombard,^l Gendron,^m and Reevesⁿ mention 17 cases where the patient's age exceeded fifty; and Jacquez reports several cases where the age exceeded sixty, and one where it was more than seventy.^o Trousseau records the case of a woman aged 64, in whose body the characteristic abdominal lesions were found after death.^p These lesions have likewise been found by Wilks in a woman aged 70;^q by Lombard, in a woman aged 72;^r by M. D'Arcy, in a woman aged 86,^s and by Hamernyk in a patient aged 90.^t

3. *Mode of Prevalence.*—Enteric fever differs from typhus and relapsing fever, in being essentially an endemic disease. It is, in fact, the endemic fever of England, as it is of France and America. The following table shows the number of cases

ⁱ CHARCELLAY, 1840.^j MANZINI, 1841.^k LOUIS, 1841, ii. 353.^l LOMBARD et FAUCONNET, 1843, p. 591.^m GENDRON, 1829.ⁿ REEVES, 1859.^o JACQUEZ, 1845.^p TROUSSEAU, 1859.^q *Path. Soc. Trans.* vol. xiii. p. 68.^r LOMBARD et FAUCONNET, 1843, p. 592^s GAULTIER DE CLAUDRY, 1849, p. 30.^t GRIESINGER, 1864, p. 154.

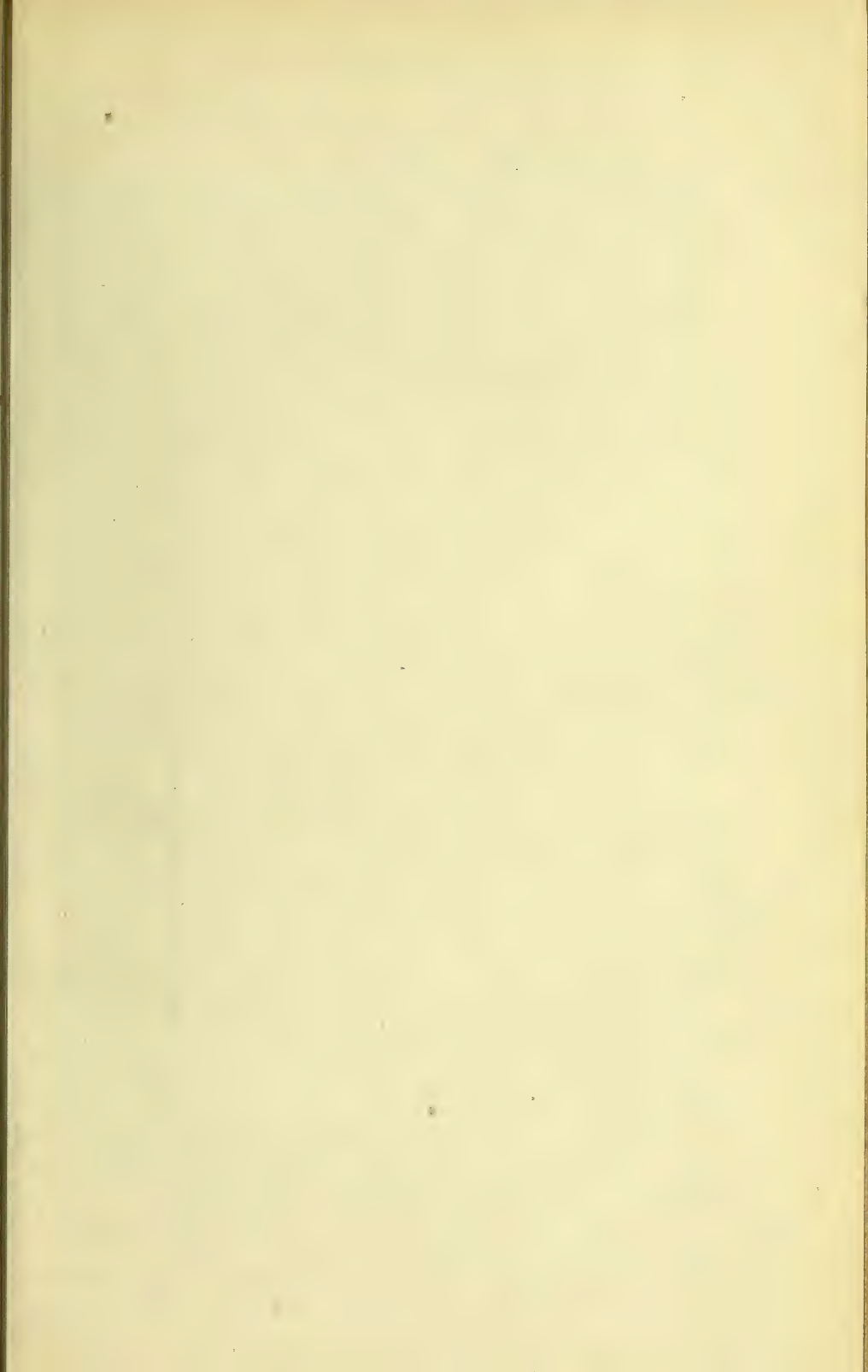
admitted into the London Fever Hospital, and Glasgow Infirmary, during the years that the disease has been distinguished from typhus :—

TABLE XL.

Years	London Fever Hospital	Glasgow Royal Infirmary	Years	London Fever Hospital	Glasgow Royal Infirmary	Edinburgh Royal Infirmary
1847	?	127	1860	95	91	41
1848	152	7	1861	161	36	35
1849	138	?	1862	220	79	79
1850	137	?	1863	174	56	67
1851	234	44	1864	253	40 ^a	140 ^a
1852	140	134	1865	523	89 ^a	77
1853	212	45	1866	582	68	19
1854	228	92	1867	380	99	120
1855	217	145	1868	459	224	104
1856	149	163	1869	369	131	79
1857	214	157	1870	595	105	69
1858	180	117				
1859	176	87	Total	5,988	2,002	880

From this Table it is obvious that the number of cases in the London Fever Hospital has varied little from year to year. During the first 17 years of the table (1848–64) the average annual number was 181; or eliminating the year 1860, which was exceptional for reasons hereafter mentioned, the average was 186, the largest number 253, and the smallest 137. The mode of prevalence then of enteric fever presents a marked contrast to that of typhus, as may be seen in Diagram I., and on comparing Tables I. (page 51) and XL. Moreover, its prevalence is quite independent of that of typhus. Thus, in 1856, when 1,062 cases of typhus were admitted into the London Fever Hospital, the number of enteric cases did not exceed 149; but in 1858, when the typhus cases had dwindled down to 15, the enteric cases did not decrease in like manner, neither did they increase to take the place of typhus, as some writers alleged. In fact, the admissions of enteric fever for the year 1858 corresponded exactly to the average of the ten preceding years, the former being 180, and the average 182. Again, the appearance of the last great epidemic of typhus in London was marked by no increase or diminution of enteric fever. Thus the admissions of typhus into the Fever Hospital in the two years (1862–3) being 1,827 and 1,309, those of enteric

^a In this and the subsequent four years the admissions into the City of Glasgow Fever Hospital are included with those into the Royal Infirmary.



The new town of Edinburgh is pre. eminently
a water-closet town, but it has been found im-
practicable to supply the old town with water-
closet accommodation. To this day they have to
make use of pails for the reception of the excreta of
flats conveyed to the house. These pails are brought to
the street daily & emptied into carts provided
by the authorities. The authorities have also
provided numerous public privies in the old
town, which are daily cleared out by the public
scavenger. In 1874, 27,294 houses had
water-closets & 14,319 none, the latter com-
prising among the worst parts of the old town
no less than 13,583 of them being rented under
£12. Notwithstanding the low morality of the
population, the bad ventilation & the crowding
together, typhoid fever & diphtheria are prac-
tically unknown in these houses, whereas the
new & water-closeted town they are never

the estimation of excreta in living rooms is quite a thing

A SOURCE OF TYPHOID FEVER.

W. Standard. Jan. 18 1875

On Saturday evening, at the meeting of the Society of Medical Officers in London, an important paper was read by Dr. Andrew Fergus, President of the Faculty of Physicians and Surgeons of Glasgow. Starting from the basis that typhoid fever was induced either by drinking polluted water or by inhaling polluted air, Dr. Fergus showed that in Glasgow, where the entire water supply is derived from Loch Katrine, and conveyed through pipes in such a way as to preclude the possibility of excremental pollution, typhoid fever had gone on increasing in a most remarkable manner. He also showed, by reference to the general death rates, that as a broad fact typhoid and diphtheria had notably increased elsewhere since the present system of sewers and of closets communicating therewith had been completed. Reciting many remarkable facts in connection with cases of typhoid and diphtheria that had come under his notice in consultation with the medical practitioners of Glasgow, he exhibited several pieces of four-inch leaden pipe curiously perforated upon their upper segments by corrosion, commencing from within, and which could only have been caused by the action of sewer gases. These perforations had admitted sewer gas into the houses in which mysterious cases had occurred; but, as corrosion did not take place in such parts of the pipe as were charged with liquid, the perforations never betrayed themselves by ordinary leakage. The specimens exhibited were chiefly from horizontal junction pipes which had connected closets with a vertical main pipe, and the corroded and perforated state of their upper segments contrasted strikingly with the sound and unblemished condition of the lower segments along which the liquid had descended. Dr. Fergus said that he had found that such pipes as were freely open to the sky by an upcast shaft remained sound nearly twice as long as these in which there was no effective ventilation; but he gave it as his opinion that leaden soil-pipes exposed to the action of sewer gas were not to be depended upon as sound after they had been up ten or twelve years. In pursuance of the same topic, Dr. Fergus exhibited coloured diagrams, showing the results of experiments which he had made in glass traps and syphon tubes, and he demonstrated that the present method of sealing sewer pipes with water allowed sewer gas to diffuse itself into the house by a process of soakage, and that within a period of from half-an-hour to two hours the various sewer-gases would saturate the water by which the trap was supposed to be sealed, and would thenceforth be freely emitted into the house. The specimens of perforated pipe and the diagrams exhibited by Dr. Fergus were examined with much interest, and an active discussion took place, in which Dr. Meynott Tidy, Dr. George Ross, Dr. Gibbon, Dr. Edmunds, Dr. Iliff, Dr. Vinen, and other well-known metropolitan medical officers of health took part. Dr. Tidy, while fully admitting the great importance of the subject raised by Dr. Fergus, argued that the corrosions must be peculiar to Glasgow, and due probably to the water of Loch Katrine, or other local causes. Dr. Edmunds, on the other hand, stated that he had several times seen exactly similar corrosions in London, occurring generally in the upper parts of the D trap, and he thought that Dr. Fergus had explained the real source of many mysterious cases of typhoid and diphtheria which had occurred in high-class houses, where no sort of leakage or apparent unsoundness of the soil pipes had been discovered.

BURNING of the COSPATRICK
The OCEAN, RAILWAY, and GENERAL TRAVELLERS
ASSURANCE COMPANY (Limited), Mansion House-buildings
E.C. ISSUE POLICIES against ACCIDENTS at SEA, at premium
from 3s. per cent. upwards.
Policies from 5s. to 1000s.
Special Policies for Emigrants.

R. DOLPHIN WOOD, Secretary.

THE LONDON CO-OPERATIVE WINE ASSO-
CIATION (Limited).—To facilitate comparison and select
the prices correspond with that of first-class Wine merchants. A
immediate discount of 15 per cent. is given, and to insure that t
Association is bona-fide co-operation, a bonus will if possible at ea
year's end be distributed to members, pro rata, on their purchases.
Annual tickets, 5s. Tickets now issuing, available till Dec. 31, 18
For price lists, &c., address
FREDERICK BARLEE, Secretary (pro tem.)
Stores, 44s, Strand, W.C.

INDIA OFFICE, 16th January, 1875.
BY ORDER OF THE SECRETARY OF STATE FOR INDIA
IN COUNCIL.

THE Director General of Stores for India is prepared
to receive **TENDERS** from such persons as may be willing
supply and deliver at Bombay

STEAM AND SMITHY COAL,

The Conditions of Contract may be had on application to th
Director General of Stores, India Office, Westminster, S.W., an
Tenders are to be left at his Office at any time before Two o'clock p
on the 25th January, 1875, after which no Tender will be received.
GERALD C. TALBOT, Director General.

METROPOLITAN CATTLE MARKET.—TI
Cattle Markets Committee of the Corporation of London w
meet at Guildhall on Wednesday, the 27th January inst., at Tw
o'clock precisely, to receive **PROPOSALS** for the supply of **STRA**
and **CLOVER** at the Metropolitan Cattle Market, Islington, up to t
1st May next.—Further particulars and conditions may be seen up
application at the Comptroller's Office, Guildhall, and at the Off
of the Clerk and Collector of the Market.
FERDD. BRAND, Comptroller.

HAMPSTEAD IMBECILE ASYLUM
WANTED, a competent person to act as **CLERK** to t
Steward at the above Asylum. Salary 100s. per annum, and diar
daily. Candidates, who must be between 25 and 40 years of age, m
possess a thorough knowledge of poor-law accounts, and be able
keep the steward's books, issue notices, &c. Forms of application m
be obtained at the offices of the Metropolitan Asylum District,
Norfolk-street, Strand, where applications, accompanied by rec
testimonials, must be delivered not later than Twelve o'clock
Wednesday, the 20th January instant.

TONBRIDGE SCHOOL.—As Dr. WELLDON
has placed his resignation of the Head Mastership of the T
bridge School in the hands of the Governors, and has signified his
intention of retiring next Skinners' Day, it has been thought desira
that a **MEETING** of past and present Tonbridgians, Pupils of t
Welldon, should be held at the Freemasons' Tavern, Great Que
street, Lincoln's-inn-fields, on January 27th, at Four o'clock, to c
sider the propriety of raising some permanent **MEMORIAL** of t
long and successful management of the School, and to appoint
Committee to carry out the resolutions of the Meeting. The att
ance of old and present Pupils is particularly requested on t
occasion.

All communications meantime may be addressed to the Rev. Jc
Stroud, South Perrot Rectory, Crevierne; or Septimus Rivingto
Esq., 3, Waterloo-place, Pall-mall, London. S.W.

ENDOWED SCHOOLS ACTS, 1869, 1873
NORTH LONDON COLLEGIATE and CAMDEN SCHOOC
for **GIRLS**—The Committee of Council on Education have appro
of a **SCHEME** for the future management of the above-nam
Schools; and Notice is hereby Given that unless within two mon
after the publication of this Notice a Petition is presented to t
Majesty in Council in pursuance of Section 39 of the Endowed Sch
Act, 1869, or a Petition is presented to the Committee of Council
Education in pursuance of Section 13 of the Endowed Schools A
1873, such Scheme may be approved by her Majesty without be
laid before Parliament.

Copies of the Scheme, price Sixpence each, may be obtained f
Mr. Downs, bookseller, of Watford, or at the office of the Cha
Commissioners, 2, Victoria-street, S.W.

The Scheme may also be seen without charge at the said office of
Charity Commissioners.

PATRICK CUMIN, Assistant Secretary

Education Department, Jan. 15, 1875.

ENDOWED SCHOOLS ACTS, 1869 187
ALDENHAM RICHARD PLATT'S CHARITY.—The C
mittee of Council on Education have approved of a **SCHEM**
the future management of the above-named Charity; and Not
that unless within two months after the publicati

1,000
1,000
1,031
1,781
1,871
1,871

fever were only 220 and 174, the average being 187, or almost exactly the same as that of the sixteen years above referred to. But the statistics of the Fever Hospital show a great increase of enteric fever in London during the last six years of the Table (1865-70). The smallest number in these years was 380 and the largest 595, the average for the six years being 484. The increase is perhaps accounted for by the extension of the Fever Hospital buildings (see Preface) and by the unusually high temperature of certain of the years (see page 449), but it is not a little remarkable that this increased prevalence of enteric fever in the metropolis has been contemporaneous with the completion of the main drainage scheme. It is noteworthy that the increase of enteric fever did not commence until three years after the commencement of the great epidemic of typhus, and that it persisted after the latter had subsided.

In Glasgow enteric fever is also endemic, and in its prevalence independent of typhus. During nineteen years (1851-1869) the annual admissions into the Royal Infirmary and Fever Hospital averaged 100, never exceeded 224, and were never less than 36, although the annual admissions of typhus varied from 175 to 3,488. Again, in 1858 there were 117 cases of enteric fever to 175 of typhus, whereas in 1847 there were only 127 enteric cases to 2,399 cases of typhus, and 2,333 cases of relapsing fever, and in 1865, 89 enteric cases to 3,488 cases of typhus.*

So also in Edinburgh, enteric fever has been as common in years when typhus has been almost unknown, as it has been during some of the greatest epidemics of typhus. In 1862, 79 cases of enteric fever and 14 of typhus were admitted into the Royal Infirmary, whereas in 1866 there were 69 cases of enteric fever and 847 of typhus. As predicted in the first edition of this work (p. 415), the prevalence of enteric fever was in no way affected by the subsequent outbreak of typhus.

From all accounts enteric fever appears to have been much more common in Edinburgh during the last few years than it was formerly, although it was certainly not such a rare disease in former years, as has been imagined. In 1827 Alison stated that he had frequently seen children presenting all the symptoms and *post-mortem* appearances of the fever described by French writers.† Christison observed the same fever in

* Since the introduction of its unrivalled water supply, enteric fever appears to have diminished in Glasgow, which in this respect contrasts favourably with London and Edinburgh.

† ALISON, 1827.

1829,^x and a few years later several cases came under the care of Craigie^y and Home. Home found Peyer's patches ulcerated in 7 of 101 dissections of fever.^z On examination of the *Post-mortem* Registers of the Royal Infirmary, I ascertained that in the years 1833-8 either 2 or 3 cases were dissected annually, 15 cases in all during the six years. Of 132 cases of fever dissected by Dr. John Reid between 1838 and 1842, ulceration of Peyer's patches was present in 8; and only one-fourth of the fatal cases were examined.^a In 1842 ulceration of Peyer's patches was found in 3 out of 29 cases; and in 85 fatal cases of fever the intestines were not examined.^b Between November 1, 1846, and June 1847, 19 cases of fever with ulceration of Peyer's patches were dissected in the Royal Infirmary;^c and from 1854 to 1861, the number dissected in each year was as follows:—1854, 5 cases; 1855, 2 cases; 1856, 1 case; 1857, 8 cases; 1858, 1 case; 1859, 2 cases; 1860, 1 case; 1861, 6 cases. It is clear from these facts that enteric fever is no new disease in Edinburgh, but it is no less true that it has been a much more common disease in the town of Edinburgh of late years than it was formerly. From the evidence of John Reid, Peacock, and Robertson,^d it appears that during the five years 1838-42 and the three years preceding 1847, not one case of fever with intestinal lesion was dissected in the infirmary, in which the patient had contracted his illness in the town. But the town of Edinburgh no longer enjoys this immunity. In 1862 we are informed by Dr. W. T. Gairdner that a large proportion of the cases were indigenous,^e and in 1863 Christison stated that for some years it had been a common disease among the old residents,^f while the admissions into the Royal Infirmary since 1862 (see Table XL) show that the disease is now endemic in Edinburgh as it is in London. It is to be noted that this increase of enteric fever in Edinburgh followed the introduction of new sanitary arrangements—the substitution for the scavenger and nightmen of drains opening into the interior of the houses, but with a water supply insufficient to prevent the escape of sewer-emanations.^g

Enteric fever has formed no part of the great fever-epidemics which have devastated Britain, although cases are met with

^x CHRISTISON, 1858, p. 558.

^y CRAIGIE, 1834, and 1837.

^z STARK, 1865, p. 310.

^a REID, 1840 and 1842.

^b PEACOCK, 1843.

^c BENNETT, 1847; WATERS, 1847.

^d ROBERTSON, 1848.

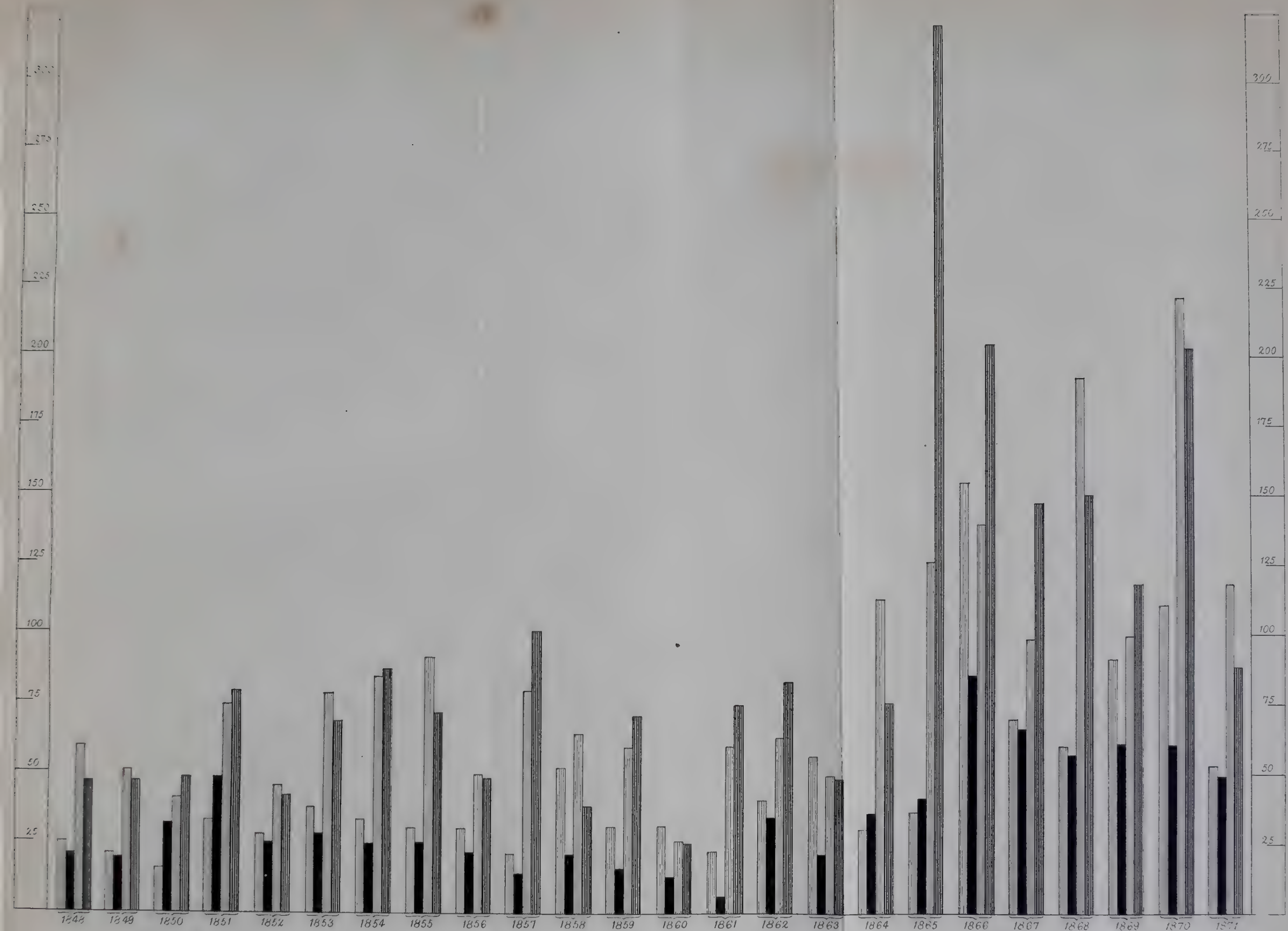
^e GAIRDNER, 1862 (No. 2), p. 170.

^f CHRISTISON, 1863.

^g See GAIRDNER, 1862 (No. 1), p. 255.

about 1 one often very prevalent, & their cases
have often been greatest in the best housed.

(From Letter from Dr. Littlejohn, Med. Off. of Health
for Poland. to W. Hayward Engineer to the Com.
mmissioners of Sewers for the City of London.) - 1876)



DIÁGRAM XIII, shows the Quarterly admissions of Enteric Fever, into the London Fever Hospital, during twenty four Years. (Compare with Diagram III)

during these epidemics, just as we meet with cases of measles and small-pox.^g But although essentially an endemic disease, it may become epidemic even in localities where for years before it has been unknown. These epidemics, however, are distinguished from epidemics of typhus, in being local and circumscribed. Sometimes they are confined to a single house or village. Many illustrations of such epidemics will be subsequently adduced; others will be found in the works of John Reid,^h Stewart,ⁱ and Bartlett;^j and particularly in the reports on epidemics presented to the French Academy,^k and in those published by the medical officer of the Privy Council. Owing to the circumscribed character of its epidemics, enteric fever has often been named from the localities in which it has occurred. Thus we read of the 'Croydon Fever,' the 'Westminster Fever,' the 'Cowbridge Fever,' and the 'Windsor Fever.'

4. *Months and Seasons.*—Unlike typhus, enteric fever varies greatly in its prevalence according to the months and seasons of the year. The monthly admissions during twenty-three years into the London Fever Hospital are given in Table XLI. Diagrams XIII. and XIV. also show the admissions in the quarters and seasons of each year.

It is obvious from Table XLI., that by far the largest numbers have been admitted during the autumn months, October, November, September, and August, in the order here given, and the smallest in April, May, February, and March. In the two months, October and November, 27·7 per cent. of the entire number were admitted; but in April and May only 7·3 per cent. Moreover, this great increase of enteric fever in the autumn months was observed in each of the twenty-three years, with one noteworthy exception (1860) hereafter alluded to; and, although the different continued fevers have only been registered at the Fever Hospital since 1847, I find, on referring to the printed reports for at least twenty years before, that ulceration of the bowels was always noted as most common during autumn. The contrast between enteric fever and typhus in this respect will be apparent, on comparing Table XL₁ with Table V. (page 66), and Diagram XIII. with Diagram III. T/

It is also worth noticing that the increased prevalence of

^g See the accounts of the epidemics of 1826 and 1847, at pp. 44 and 49.

^h REID, 1842.

ⁱ STEWART, 1840 and 1858, p. 275.

^j BARTLETT, 1856, pp. 99, 106.

^k See *Bibliography*, 1833, 1849, and 1850, and particularly 1849, p. 54.

Review in Dublin Journal Vol. 10 p. 101

TABLE XII.¹
Enteric Fever. Months and Seasons.

Years	January	February	March	April	May	June	July	August	September	October	November	December	Spring	Summer	Autumn	Winter	Total
1848	9	9	7	4	4	13	16	17	26	17	19	11	15	46	62	29	152
1849	9	7	5	3	4	12	16	16	19	25	16	6	12	44	60	22	138
1850	6	5	5	7	14	11	15	13	13	17	17	14	26	39	47	25	137
1851	13	8	12	8	16	24	29	18	27	24	30	25	36	71	81	46	234
1852	10	12	9	7	9	9	4	22	19	12	12	18	22	35	43	40	140
1853	17	7	14	5	6	17	11	34	33	29	26	13	25	62	88	37	212
1854	13	13	7	6	8	10	15	20	49	51	20	16	21	45	120	42	228
1855	16	9	5	9	10	7	25	40	26	25	22	24	23	72	73	49	217
1856	12	10	8	8	7	7	7	28	14	15	28	5	23	42	57	27	149
1857	8	5	8	4	1	9	19	26	34	38	33	29	13	54	105	42	214
1858	32	7	13	5	9	7	13	29	22	20	15	8	27	49	57	47	180
1859	12	7	12	4	5	7	11	20	28	33	26	11	21	38	87	30	176
1860	14	8	10	7	4	2	7	10	9	6	6	13	21	19	21	34	95
1861	8	7	6	3	1	2	10	18	31	30	31	13	10	30	92	29	161
1862	17	6	17	4	5	25	21	23	19	35	32	16	26	69	86	39	220
1863	20	21	15	4	9	8	14	12	23	23	14	11	28	34	60	52	174
1864	7	14	9	14	10	12	18	50	44	39	26	10	33	80	109	31	253
1865	14	18	4	6	6	29	28	48	50	94	128	98	16	105	272	130	523
1866	72	48	34	25	31	29	38	50	51	63	84	57	90	117	198	177	582
1867	30	16	23	19	18	29	27	25	46	60	56	31	60	81	162	77	380
1868	20	21	19	15	19	23	23	76	93	67	53	30	53	122	213	71	459
1869	33	23	35	22	19	20	18	35	46	39	49	30	76	73	134	86	369
1870	41	25	44	21	17	23	49	91	81	77	76	50	82	163	234	116	595
Total	433	306	318	209	232	335	434	721	803	839	819	539	759	1,490	2,461	1,278	5,988

¹ See note ^e, p. 66.



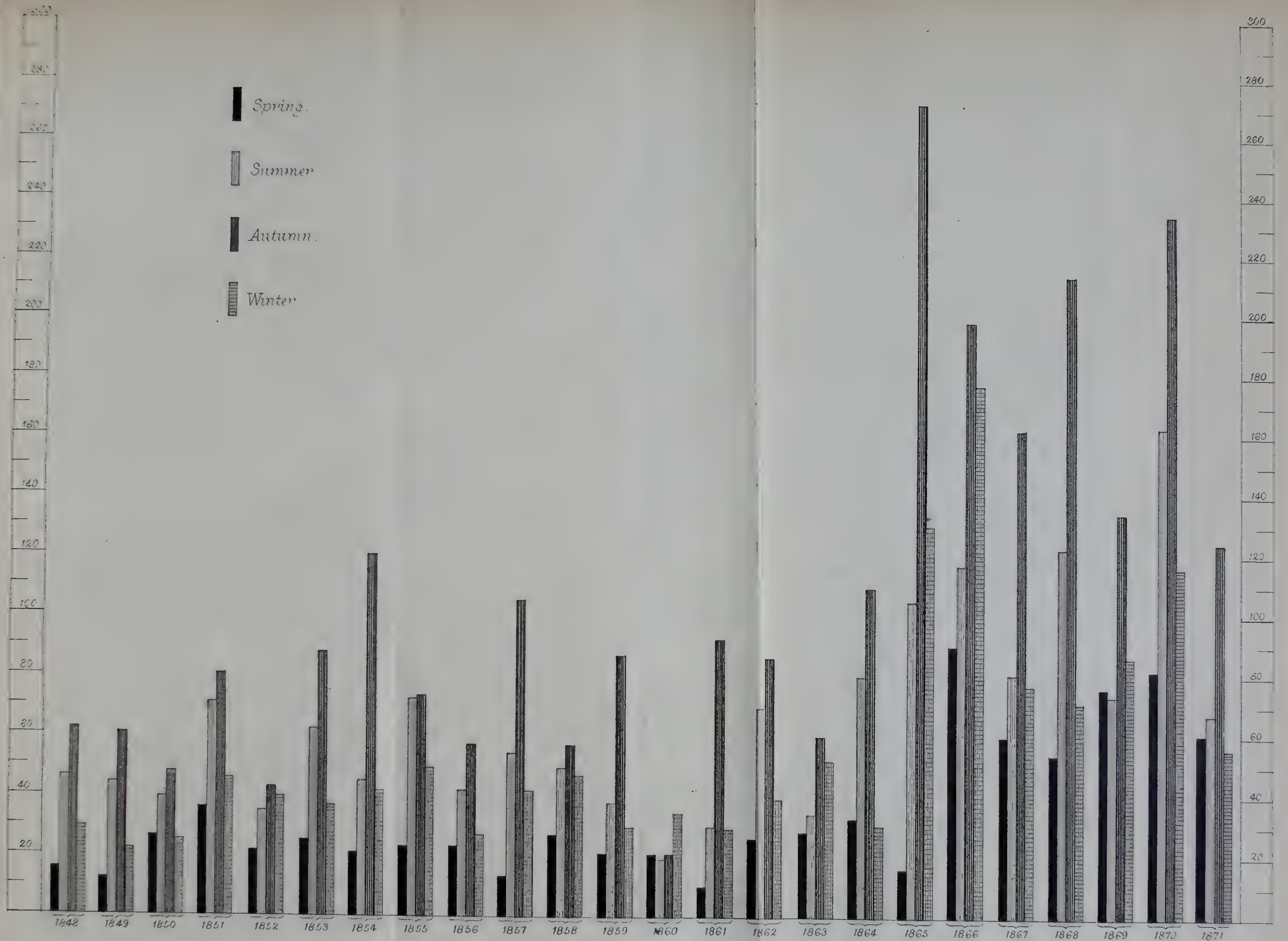


DIAGRAM XIV, shows the number of admissions of Enteric Fever, into the London Fever Hospital, during each Season of twenty four Years. (As to "Winter," see page 66, note e)

enteric fever in autumn does not subside immediately on the advent of winter. In fact, in the winter months of December and January the cases have been more numerous than in June and July. The disease, which is at its maximum towards the end of autumn, continues to decrease until April, when it is at its minimum, and then progressively increases through the summer and autumn months. It would seem as if the cause of the disease were only exaggerated or called into action by the *protracted* heat of summer and autumn, and that it required the *protracted* cold of winter and spring to impair its activity or to destroy it.

The increased prevalence of enteric fever in autumn is not limited to the Fever Hospital, or to London. Numerous inquiries have convinced me that the same rule holds good at the other Metropolitan Hospitals. Of 131 cases treated by the late Dr. Todd, in King's College Hospital, during a period of twenty years, I ascertained that 21 were admitted in spring; 25, in summer; 51, in autumn; and 34, in winter.^m Thirty-five years ago Dr. Burne stated that there was no evidence of intestinal disease in the Continued Fevers of London, "except in autumn."ⁿ Most of the outbreaks of enteric fever in the provincial towns and villages of England, which have been recorded in the medical journals during the last thirty years, have occurred during autumn;^o while the 'autumnal fever,' observed by Sir John Pringle and Ruttie in Britain and Ireland during the last century, was apparently the same disease.^p In Glasgow in 1836 and 1837, Dr. Stewart observed that the cases of 'typhoid fever' admitted into the Infirmary were very numerous in the latter part of summer and in autumn, very few in winter and spring.^q During September, October, and November, 1857, 18 cases were admitted into the Edinburgh Royal Infirmary; but in the three spring months of the same year, only 6 cases.

Similar observations have been made on the continent. At Geneva, M. Lombard long ago observed that the disease was always most prevalent in autumn.^r Messrs. Rilliet and Barthez remark:—"Les nouveaux faits que nous avons recueillis concordent avec les conclusions auxquelles sont arrivés MM. les docteurs Marc d'Espine et Lombard, savoir, que l'automne est

^m *Brit. and For. Med. Chir. Rev.* Oct. 1860.

ⁿ BURNER, 1828, p. 129.

^o See EDMONDSTONE, 1818; *Bibliogr.* for 1846; *The Croydon Fever*, *Bib.* 1852; BEADLE, 1853; CAMPS, 1855; BUDD, 1856; MURCHISON, 1859 (No. 3).

^p PRINGLE, 1752, p. 226; RUTTY, 1770, pp. 196, 202, 320.

^q STEWART, 1840, p. 291.

^r LOMBARD, 1839 and 1843.

de toutes les saisons celle qui prédispose le plus à la fièvre typhoïde. Les trois épidémies qui ont spécialement atteint les enfants dans le canton de Genève ont toutes eu lieu en automne. Après l'automne vient l'hiver.'^s Of 452 cases observed by Piedvache during ten years in the provinces of France, 316 occurred in autumn and winter, and only 54 in spring.^t Of 111 circumscribed epidemics which occurred in different parts of France between 1841 and 1846, 20 commenced during the first quarter of the year, 21 during the second, 39 during the third, and 36 during the fourth.^u In the 'Département du Doubs,' Druher says that the disease is always most common in autumn and winter.^v Of 183 cases at Strasbourg reported by Forget, 60 occurred in autumn, 49 in summer, 38 in spring, and 36 in winter.^w In Berlin, I have been informed by Dr. Quincke, one of the physicians to the Charité Hospital, that the disease is always most prevalent in autumn, and least prevalent in spring.^x

In America, Bartlett states that his impression is that enteric fever is most prevalent in autumn. Of 645 cases admitted into the Lowell Hospital during seven years, 250 were in autumn, and only 104 in spring.^y Wood says that 'it is always most common in autumn and winter;'^z while Austin Flint remarks, that in New England it exhibits such a manifest predilection for the autumn, that it is there designated 'Autumnal or Fall Fever.'^a

5. *Temperature, Moisture, and Soil.*—Not only does enteric fever increase in autumn, but it has been found to be unusually prevalent after summers remarkable for their dryness and high temperature, and to be unusually rare in summers and autumns which are cold and wet. The summer and autumn of 1846 were remarkable for their great heat, and the medical journals contain accounts of numerous outbreaks of enteric fever in various parts of the country—districts of England,^b where the subsequent epidemic of typhus never appeared. Even in France, which was also not visited by typhus, 'typhoid fever' was unusually prevalent in the autumn of 1846, and was attributed by many to the excessive heat.^c The Report of the

^s BARTHEZ and RILLIET, 1853, ii. 715.

^u GAULTIER DE CLABRY, 1849, p. 8.

^w FORGET, 1841, p. 409.

^x For further evidence of the same nature, see GRIESINGER, 1864, p. 149.

^y BARTLETT, 1856, p. 101.

^z FLINT, 1852, p. 20.

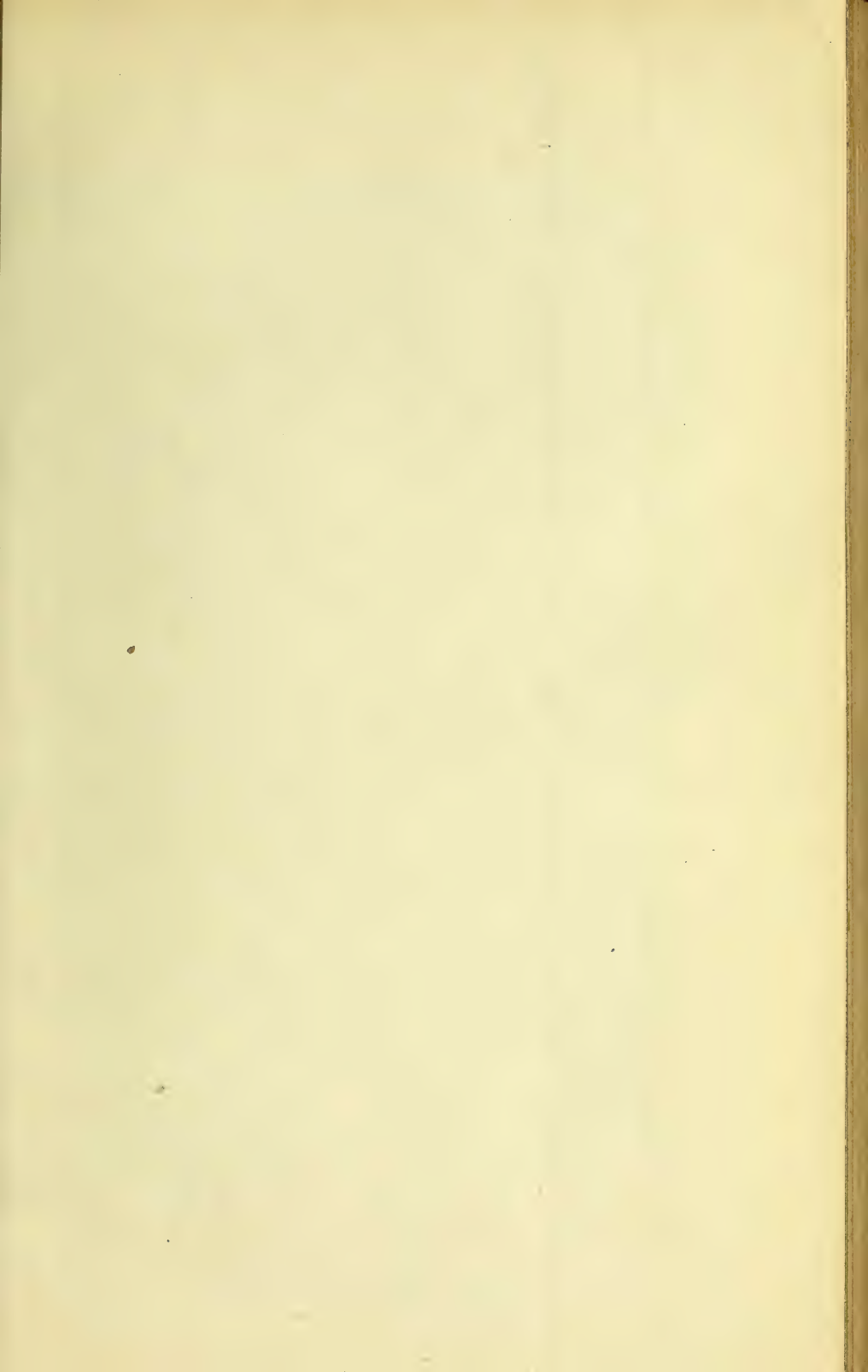
^a DE CLABRY, 1849, pp. 18, 60.

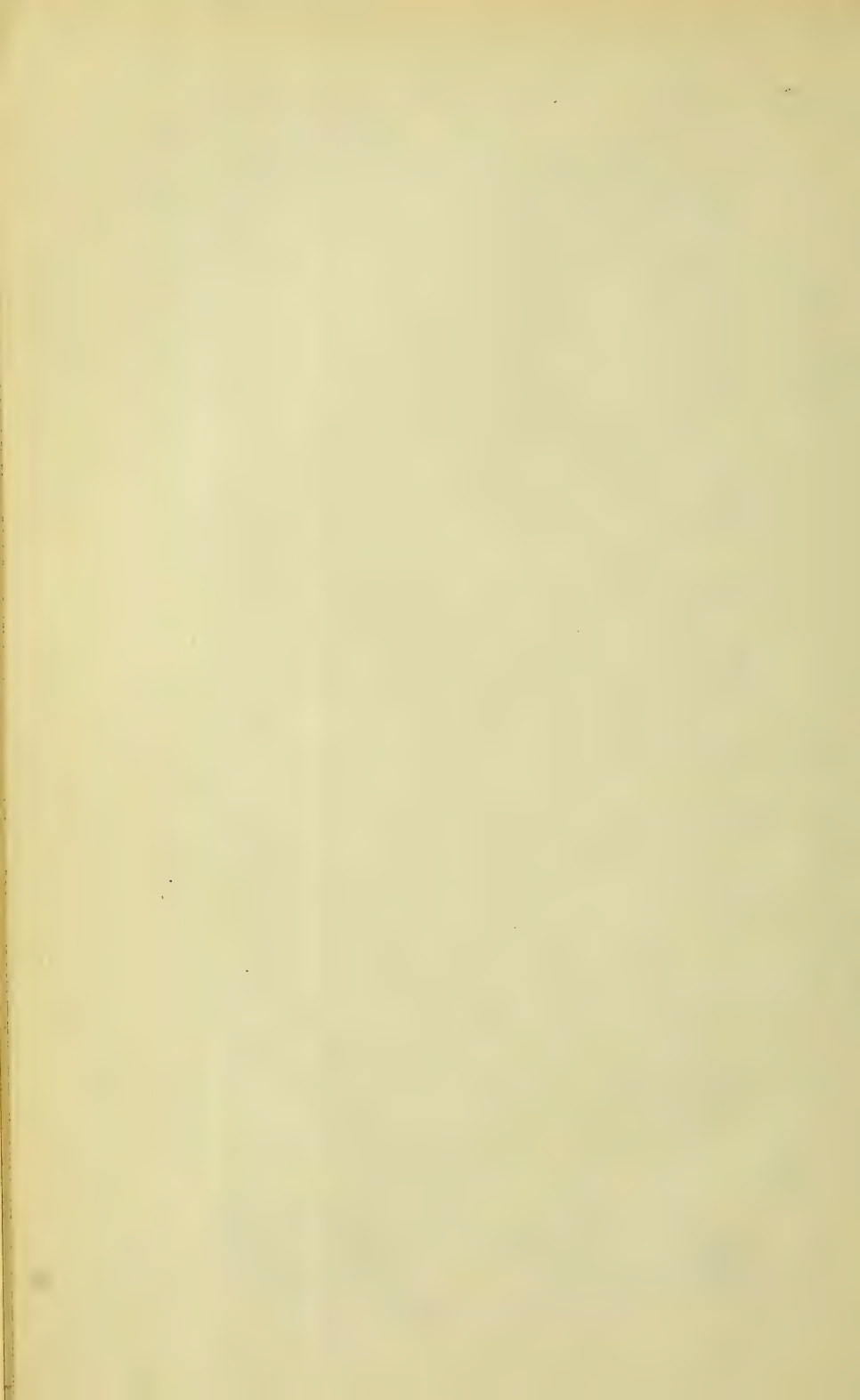
^t PIEDVACHE, 1850, p. 20.

^v DRUHER, 1858.

^z *Treat. on Pract. Med.* 4th ed. i. 389.

^b See *Bibliography* for 1846.





London Fever Hospital for that year states, that 'in the unusually hot weather that prevailed in the summer and autumn months, diarrhoea occurred in almost every case of fever,' and that in the fatal cases 'the intestines were extensively diseased.' It is not surprising, then, that an unusually large number of cases should have been observed in Edinburgh in the autumn and winter of 1846-7. As I have already shown, this outbreak was independent of the great epidemic of typhus which immediately succeeded (see pages 49 and 76). The summers and autumns of 1865, 1866, 1868, and 1870 were also remarkable for their great heat and prolonged drought, and for an unusual and early increase of enteric fever (see Table XLI). Many instances will be alluded to hereafter of outbreaks of enteric fever occurring after prolonged hot and dry weather; but for the present it suffices to observe, that if a very hot season happens during an epidemic of typhus, both typhus and enteric fever may be unusually prevalent at one time, without necessitating the inference that both spring from a common origin. This was, possibly, the explanation of the slight increase of enteric fever observed towards the end of the typhus epidemic of 1826⁸ (see page 44); at all events, the summer and autumn of 1828 are said to have been remarkably hot. In 1837, Cless collected the records of all the outbreaks of enteric fever which had occurred at Stuttgart from 1783 to that date: all occurred in autumn or at the end of summer, and all had been preceded by unusually hot seasons.^a

On the other hand, there have been few years in which the summer and autumn have been more cold and wet in England than in 1860, while the remarkable diminution in the prevalence of enteric fever over the whole country in that year, and in London during the wet autumn of 1872, was a subject of general observation. On referring to Table XLI., it will be seen that the admissions into the Fever Hospital for 1860 fell to one-half of the average of the previous twelve years, and that this diminution was due to the absence of the ordinary autumnal increase.

Mere dryness of the atmosphere, however, is not conducive to an increase of enteric fever. On the contrary, warm damp weather, when drains are most offensive, is often followed by an outbreak of the disease. An increased rainfall, however, sweeps away those impurities to which the origin and spread of the disease are in drained towns mainly due; but in un-

^a CLESS, 1837. For other illustrations of the increase of enteric fever in seasons of excessive heat in France, see DE CLAUDEY, 1849, p. 18.

drained places it may conduce to an outbreak of the disease, by washing those impurities into water used for drinking purposes, as happened at Festiniog in 1863,^e and in Dundee in 1864.^f

Professor Pettenkofer and M. Buhl of Munich have endeavoured to show that the prevalence of enteric fever depends solely upon the presence of a certain amount of water in the soil. The poison, to which they believe that the disease is due, multiplies in the soil rather than in the bodies of the sick, the necessary conditions being a porous soil, saturated in its lower parts with water, and this water rapidly falling after having attained an unusual height. The connection between these conditions and the prevalence of enteric fever in Munich, over a long series of years, appears by their researches to be clearly established, and the connection does not seem, as Buchanan has argued, always to be explained by an increased filtration under the circumstances in question of organic impurities into the surface-wells supplying water for drinking purposes. Still Prof. Pettenkofer's views as to the origin of enteric fever are, in my opinion, too exclusive, failing to account for the frequent connection observed in this country between defective house drainage or impure drinking water and enteric fever, quite irrespective of any variations in the subsoil water; while at Terling it was shown by Dr. Thorne that a great outbreak of enteric fever in 1867 was coincident with a rise in the subsoil water after drought.^g

6. *Intemperance, Fatigue, and Mental Emotions.*—There is no evidence that they predispose to enteric fever. In France, drunkards are said to be not more liable to the disease than temperate persons (see pages 69 and 325).

7. *Previous Diseases.*—It is doubtful if previous illness increases the liability to enteric fever. Most patients are in good health at the time of seizure.

It is necessary, however, here to allude to certain relations supposed to subsist between enteric fever on the one hand, and variola, malarious fevers, and phthisis, on the other.

Several French writers^h opposed to vaccination have laboured to show that the practice has effected no reduction, but only a 'displacement' of mortality, and that, although small-pox has

* BUCHANAN, in 6th *Rep. of Med. Off. of Privy Council*, 1864, p. 787.

^f MACLAGAN, T. J., 1867.

^g See on this subject PETTENKOFER, 1869; various essays by BUHL, SEIDEL, PETTENKOFER, BUXBAUM, &c., in the first six volumes of the *Zeitschrift f. Biologie*, 1865-70; BUCHANAN, *Med. Times and Gaz.*, March 12, 1870; PETTENKOFER, *Ibid.* June 11, 1870; and THORNE, in 10th *Rep. of Med. Off. of Privy Council*, p. 51.

^h ANCELOIN and BAYARD, 1851; GRESSOT, 1855; CARNOT, 1856.



been arrested, it has been replaced by enteric fever, which, according to them, is nothing more than an internal variola, the eruption being developed in the intestines instead of on the skin. It has been even proposed to the French Academy to prevent enteric fever by vaccinating some portion of the mucous membrane. The subject was investigated with the utmost care by the French Academy, and the result was a complete refutation of M. Carnot's doctrine. 1. Enteric fever was not unknown before the introduction of vaccination, as has been stated, but was as prevalent then as it is now. 2. It is only in exceptional cases that the intestinal lesions of enteric fever bear a distant resemblance to the pustules of variola; and even then, the two morbid conditions are essentially different. 3. An attack of one disease confers no immunity from an attack of the other. Many instances have been observed, where persons have been attacked with enteric fever immediately after having had small-pox, and where convalescents from enteric fever have been seized with small-pox.ⁱ 4. The few vaccinated persons who suffer on exposure to the variolous poison are attacked with small-pox, although, according to M. Carnot's doctrine, when the variolous poison acts on the vaccinated body, the result ought to be enteric fever.^j

Of even greater interest is the antagonism supposed to exist between enteric fever and the malarious fevers. The opinion has long been prevalent in America that enteric fever has a tendency to take the place of intermittents and remittents, as these diseases, from the effects of cultivation and other causes, decrease or disappear.^k This opinion has been to some extent corroborated by the investigations of M. Boudin,^l who has endeavoured to demonstrate an antagonism between the diseases in question. According to this writer, localities where the constitution of the inhabitants is modified by malaria, are remarkable for the rarity of enteric fever, while localities remarkable for the prevalence of enteric fever are likewise noted for the rarity and mildness of intermittents. Thirdly, he states, that the drying up of a marsh or its conversion into a lake diminishes or arrests intermittents, but disposes the system to a new group of diseases, of which pulmonary phthisis and enteric fever are the most prominent; and fourthly, he

ⁱ See, for example, Trousseau's *Clin. Lect.* Syd. Soc. Ed. p. 153.

^j On this subject, see Mr. Simon's Report on Vaccination, 1857, p. 56; also BARTHEZ and RILLIET, 1853, iii. 63.

^k BARTLETT, 1856, p. 100.

^l BOUDIN, 1846.

maintains that, by residing in a marshy country, an individual acquires an immunity from enteric fever, the degree and duration of which are in direct proportion to the length and degree of the residence. M. Boudin mentions some remarkable instances of French regiments, which, after a lengthened exposure to malaria in Algeria, returned to France, where they remained exempt from enteric fever, although many cases were occurring in other regiments quartered in the same barracks. But it is doubtful if any *antagonism*, such as M. Boudin has endeavoured to establish, really exists between intermittents and enteric fever. The latter is not unknown in countries remarkable for the prevalence of intermittents: it is not uncommon in India, Burmah, and other malarious countries, where it has probably been often *mistaken for* remittent fever. The facts mentioned by American writers and by M. Boudin suggest a *similarity*, rather than an *antagonism* of enteric and malarious fevers, the poisons in both instances being generated under similar circumstances. In connection with this subject, a remarkable communication made to the French Academy of Sciences in 1845 by M. Ançelon may be mentioned.^m Many years before, enteric fever had been constantly endemic in the commune of Guermange, in the duchy of Lorraine, making its appearance every year during the hot season; but for twenty-five years it had entirely disappeared from the northern part of the commune, its disappearance having been simultaneous with the suppression of a stagnant pond in that locality. In the southern part of the commune, however, there had been epidemics of intermittent fever every third year (viz., 1829, 1832-5-8, 1841,) alternating with epidemics of enteric fever (1830-3-6-9, 1842), and of furuncular diseases (1831-4-7, 1840-3). In this part of the commune there was a large lake called the 'Indre basse,' which every third year was emptied and cultivated, and afterwards the water was allowed to collect again for two years. The intermittent fevers appeared during the first year that the pond was full of water. The epidemics of enteric fever coincided with the second year. In the autumn of this year the pond began to dry up, and M. Ançelon attributed the fever to the action of heat and moisture upon an immense quantity of animal and vegetable débris, which during the two years had been collecting upon the banks of the lake. The houses in the commune were also very badly drained. This is far from being a solitary instance. M. Killiches has

^m ANÇELON, 1845.

recorded an outbreak of enteric fever which occurred in a small town of Bohemia, on the drying up of a lake.ⁿ Other instances will be found in the Reports on Epidemics to the French Academy.^o

According to M. Forget, persons labouring under phthisis are rarely attacked with enteric fever. The former he regards as a preservative against the latter.^p Whether this be so or not, an attack of enteric fever is often followed by tubercular deposit in the lungs; but such occurrences do not justify the view put forward by Drs. J. Harley^q and H. Kennedy^r that the intestinal ulcers of tuberculosis and enteric fever are indistinguishable. (See Section III).

Lastly, it is maintained by Stöber, Löschner, and Friedleben,^s that enteric and scarlet fevers bear an inverse ratio, as regards epidemic prevalence, and that when one prevails, only solitary cases of the other are to be met with. My experience is opposed to their observations. I have often noticed the two diseases unusually prevalent at the same time. It was so at Windsor in 1858; and the year 1870 was notable for the largest number ever known of admissions of both scarlet and enteric fevers into the London Fever Hospital. Moreover, the returns of the Registrar-General show that the mortality from scarlet fever is always greatest at the end of autumn, the time at which enteric fever is also most prevalent. Scarlatina appears indeed to predispose to enteric fever. Of 12 patients who took enteric fever in the London Fever Hospital during 23 years, 8 were admitted with scarlatina (see page 462). In several of these cases, there was reason to think that the enteric as well as the scarlet poison had entered the system before the patient's admission into hospital; but in none has there been more difficulty in recognizing the sequence of the two diseases, than when a patient admitted with enteric fever has contracted scarlatina in hospital. I have seen nothing to justify the opinion held by Dr. J. Harley, that scarlatina and enteric fever are different manifestations of the same poison, or that enteric fever is "an abdominal scarlatina."^t

8. *Idiosyncrasy*. Many facts seem to show that certain peculiarities of constitution favour or avert an attack.

9. *Over-crowding and Deficient Ventilation*. The prevalence of enteric fever is independent of over-crowding and deficient

ⁿ KILLICHES, 1837. ^o DE CLAUBRY, 1849, p. 54. ^p FORGET, 1841, p. 331.

^q J. HARLEY, 1873.

^r H. KENNEDY, 1873.

^s *Brit. and For. Med. Chir. Rev.* July, 1858, p. 162.

^t J. HARLEY, 1866, p. 593; and *Med. Chir. Trans.* 1872, LV., 103.

wf

ventilation. The disease prevails without distinction, not only in the most dense, but also in the least populous, districts of large towns, and is of common occurrence in country districts and even in isolated houses. As typhus and relapsing fever prevail only in crowded localities, and enteric fever in all, it follows that in the central and most crowded districts of the metropolis the number of cases of the former far exceeds that of the latter; but on passing to the suburban districts, the proportion of enteric cases gradually increases, while in the country enteric is almost the sole fever met with. This appears, to some extent, from the residences of the patients brought to the London Fever Hospital, given in Table VII., p. 72, of which the following is an abstract:—

TABLE XLII.

Districts	Population in each statute acre in 1861	Typhus and Relapsing	Enteric
<i>Central—</i>			
Holborn	229	1,021	202
City of London	156	1,222	322
St. George's-in-the-East	201	1,250	215
<i>Suburban—</i>			
Paddington	59	3	24
Hackney	21	125	145
Beyond London Districts	?	55	90

Paddington and Belgravia are two of the least populous London districts, and, at the same time, are inhabited by the better classes of the community. Now, of 12 cases of fever from Belgravia 10 were enteric, 1 typhus, and 1 febricula; and of 29 cases from Paddington 24 were enteric, 3 typhus, and 2 febricula. That enteric is the prevailing fever in each of these districts is also shown by the cases admitted into their local hospitals. By the published reports of St. George's Hospital,* situated in Belgravia, it appears that of 44 fatal cases of fever dissected during three years, there was ulceration of Peyer's patches in 29, and in 5 only were the intestines healthy. During five years (1853-7) of 117 cases of fever admitted into St. Mary's Hospital from the parish of Paddington, 75 were enteric fever, 38 febricula or of doubtful nature, and only 4 typhus; in the year 1856 only 2 cases of typhus were admitted, although in the same year there were admitted into the London Fever Hospital 1,062 cases.

* Vide *Brit. and For. Med. Chir. Rev.* 1855-6. Since 1861 many cases of typhus have been admitted into St. George's from the crowded districts of Chelsea.

The fact that enteric fever is independent of over-crowding has been a matter of general observation. For many years, most of the cases admitted into the Glasgow^t and Edinburgh^u Infirmarys were brought from the localities in the neighbouring country, and not from the crowded parts of the town, to which the cases of typhus were restricted. Bartlett observes that there is no satisfactory evidence that over-crowding predisposes to this fever in America;^v and with respect to Paris, Louis remarks:—‘Le séjour dans les lieux bas et habités par un trop grand nombre de personnes, pendant la nuit, ne peut pas non plus figurer parmi les causes dont il s’agit.’^w

But though enteric fever is far from being limited to crowded localities, deficient ventilation may favour the action of the poison, by preventing its diffusion and dilution, as happened at Festiniog in 1863.^x

10. *Recent Residence in an Infected Locality.*—Petit^y and Serres,^z and afterwards Andral,² Louis,^a and Chomel,^b strongly insisted on recent residence as a predisposing cause of enteric fever. Andral noticed that medical students were most liable to be attacked within a few weeks of their arrival in Paris. Of 129 cases which Louis gives in his work, 73 had not resided in Paris more than ten months, and 102 not more than twenty months. Again, of 92 cases of ‘typhoid fever’ under Chomel in the Hotel-Dieu, one-half had resided in Paris only one year, or less. More recently Trousseau has observed that ‘foreigners, on coming to reside (in Paris), are soon attacked by it.’ The length of residence in London of all the cases of enteric fever admitted into the London Fever Hospital during fourteen years (1848–61), where the circumstance was noted, was as follows:—

TABLE XLIII.

Less than 3 months	122	or	6·17 per cent.
„ 6 months	191	„	9·65 „
„ 1 year	318	„	16·07 „
„ 2 years	432	„	21·84 „
„ 10 years	771	„	38·98 „
More than 10 years, but not for life	149	„	7·53 „
For entire life	1,058	„	53·49 „
Total	1,978	„	100

^t STEWART, 1858.^v BARTLETT, 1856, p. 110.^u See *Reference*, p. 450.^z ANDRAL, 1823, ed. 1833, i. 484.^u Reid, 1842.^w LOUIS, 1841, ii. p. 356.^y PETIT and SERRES, 1813, p. 127.^a LOUIS, 1841, ii. 357. ^b CHOMEL, 1834.

Upwards of six per cent. of the patients had not resided in London three months before the date of their admission into Hospital. This circumstance does not admit of the explanation offered in the case of relapsing fever. It has been already pointed out that the newly-arrived patients did not come from Ireland. Almost all of them came from the provinces of England, and were in good health and comfortable circumstances at the date of their arrival in London, and for some time after. Many of them were servants in private families. Moreover, the above figures do not indicate to its full extent, the influence of change of residence in predisposing to enteric fever. A large proportion of the patients were first attacked within a few weeks after changing their residence from one part of London to another. Many illustrations of the same fact have come under my notice in private practice, and I have also met with several instances where successive visitors at the same house, at intervals of months or even years, have been seized shortly after their arrival with enteric fever, or with diarrhoea, from which the ordinary residents were exempt. These considerations point to the dependence of enteric fever on some local cause, to which the system becomes habituated by constant exposure; and in this respect enteric fever resembles dysentery, ague, and other malarious fevers. Many observations have satisfied me that the immunity of the regular inhabitants is not to be accounted for on the supposition of a prior attack, as has been suggested by Parkes and Maelagan.

II. *Occupation.*—The first edition of this work (p. 68) contained a Table showing the occupations of 5,095 patients admitted into the London Fever Hospital, of whom 1,457 were suffering from enteric fever. It is not probable that any of the occupations specified in themselves predisposed to the disease, and for this reason the Table has not been reproduced (see p. 68). It may be mentioned, however, that nearly one-third of the patients were female servants, most of whom had been in comfortable situations, and many of whom had been attacked shortly after changing their residence. Several, entered as 'labourers,' had been engaged in the public sewers before their seizure. Of 64 vagrants, 44 had typhus, 12 relapsing fever, and 8 febricula; but none, enteric fever. Of 247 hawkers and street musicians, 136 had typhus, 54 relapsing fever, and only 24 enteric fever. On the other hand, of 45 policemen, 30 had enteric fever, 10 typhus, and 5 febricula; but none, relapsing fever.



12. *Station in Life, Destitution.*—Destitution does not dispose to enteric fever. Indeed it may be doubted if persons in good circumstances are not more liable to it than the poor. While epidemics of typhus and relapsing fever invariably commence among the poorest of the population, and are, for the most part, confined to this class, it has been a common observation in almost every outbreak of enteric fever that the rich have not remained exempt, and in many instances the epidemic has commenced among the upper classes. At Nottingham in 1846, Dr. Sibson remarked that ‘very many were in good circumstances of those who were attacked:’^c at Croydon in 1852, we are told that the victims were ‘not among the poor, but among the gentry and principal tradesmen of the town:’^d at Windsor in 1858, the fever was confined, for the most part, to the upper and middle classes; the poorest and worst part of the town to a great extent escaped.^e In fact, enteric fever is far from being an uncommon disease among the upper classes in England, and even the most exalted positions offer no protection from it. Since enteric fever has appeared in Edinburgh it has been encountered ‘among people in easy circumstances, and in the best houses of the town.’^f Similar observations have been made in America by Bartlett,^g and in France by Andral,^h Louis,ⁱ Piedvache,^j and other observers. Indeed, the evidence on the point is overwhelming. The contrast exhibited by enteric fever to typhus and relapsing fever, in this respect, is borne out by the experience of the London Fever Hospital. The patients admitted into this institution may be divided into three classes, viz.:—1. The servants of subscribers, policemen, and persons able to pay for admission. 2. Free patients, not receiving parochial relief. This is a mixed class: some have been destitute, while others have been in easy circumstances up to their illness. 3. Patients paid for by the parishes, of whom about one-sixth have been inmates of a workhouse. These classes represent three different grades in worldly comfort, and the following Table shows the proportion of the different fevers in each class during twenty-three years (1848–70).

In Class I. the proportion of enteric cases is six times that of typhus and about fourteen times that of relapsing fever. In Class II. the proportion of the enteric cases is still predominant,

^c SIBSON, 1846.

^d See *Croydon*, 1852.

^e MURCHISON, 1859 (No. 3).

^f CHRISTISON, 1863.

^g BARTLETT, 1856, p. 110.

^h ANDRAL, 1823, ed. 1837, i. 484.

ⁱ LOUIS, 1841, ii. 356.

^j PIEDVACHE, 1850, p. 21.

TABLE XLIV.

	CLASS I.			CLASS II.			CLASS III.		
	Number	Percentage of each fever on total of Class I.	Percentage of cases in Class I., on total of each fever	Number	Percentage of each fever on total of Class II.	Percentage of cases in Class II., on total of each fever	Number	Percentage of each fever on total of Class III.	Percentage of cases in Class III., on total of each fever
Relapsing .	18	1.50	.85	40	4.12	1.89	2,057	7.78	97.25
Typhus .	378	31.50	2.06	395	40.72	2.16	17,495	66.18	95.76
Febricula .	111	9.25	4.97	109	11.24	4.88	2,012	7.61	90.14
Enteric .	693	57.75	11.57	426	43.91	7.11	4,869	18.42	81.31
Total .	1,200	100.00	4.19	970	99.99	3.39	26,433	99.99	92.41

although to a less extent, being more than three times those of typhus and relapsing fever. In Class III. the proportion is reversed, relapsing fever and typhus being in excess of enteric. The contrast presented by enteric fever to relapsing fever and typhus appears also from the following comparison:—

TABLE XLV.

	Per cent. of Typhus and Relapsing.	Per cent. of Enteric.
Of the paying patients	32	57.75
Of the 'free' patients	44.84	43.91
Of those sent by parishes	73.96	18.42

B. EXCITING CAUSE.

I. Contagion.^k

While it has been almost universally admitted that typhus and relapsing fever are eminently contagious, many of the best authorities have entertained grave misgivings as to the communicability of enteric fever. Andral in 1833 declared that he had never seen it exhibit the slightest contagious character, either in hospital or private practice;¹ and, in the following year, Chomel stated that not more than one in a hundred medical men in France believed it to be contagious.^m In 1840, Dr. Stewart wrote as follows:—‘In no case, though questioned

^k See note ^q, p. 80.¹ ANDRAL, 1833, i. 485.^m CHOMEL, 1834.

See two papers in B. M. Journ. for March
8th 1879 by Dr. Collie H. Taylor and replies
in B. M. J. for Ap. 19. by Dr. Murphy ~~and~~
Walker.

with the greatest care, either in Scotland, or in the hospitals of Paris, have I ever found the disease referred to contagion.ⁿ

Certain French observers, however, have recorded many facts to prove that 'typhoid fever' is communicable. Leuret, in 1828,^o showed that its introduction into Nancy was due to contagion; and in the subsequent year Bretonneau communicated to the 'Académie de Médecine' a number of observations, with the object of proving that 'dothiésentérie,' as it prevailed in the country, was eminently contagious.^p These essays were followed in 1834 by the memoir of M. Gendron of Château du Loir,^q who maintained that every case was due to contagion, and that 'typhoid fever' ought to be ranked amongst the most contagious maladies. Many additional facts tending to prove its contagious nature in country districts were subsequently recorded by various writers.^r These observations excited much discussion, physicians in Paris still maintaining that in that city the disease rarely spread by contagion, whatever might be the case in the provinces. Even Louis in 1841, while fully admitting the facts recorded by Bretonneau, Gendron, and others, stated that in his extensive experience he had only met with three instances in which the disease could be said to have originated from contagion.

In 1849, appeared the Prize Essay of M. Piedvache of Dinan: '*Recherches sur la contagion de la fièvre typhoïde.*'^s In this essay many facts noted by the author and recorded by previous observers were collected; the evidence on both sides of the question was honestly weighed, and the conclusion was arrived at that the disease was contagious, but only under certain conditions, while at the same time it was admitted that many facts 'prouvent évidemment que ce phénomène (contagion) n'a pas toujours lieu.' The same view was adopted by Trousseau.^t

In America and in Britain opinions have also been divided on the subject; but most observers now believe that, although the disease is communicable in a limited degree, it is impossible in many cases to discover any source of contagion. In England, as in France, there are writers who hold extreme views, some believing that there is no conclusive evidence that the disease is in any way contagious, while others, like Dr. W. Budd, maintain that the contagious nature of enteric fever is the 'master truth' in its history.^u The latter view has been

ⁿ STEWART, 1840, p. 298.

^o LEURET, 1829.

^p BRETONNEAU, 1829.

^q GENDRON, 1834.

^r See *Bibliography*, 1834 to 1847.

^s PIEDVACHE, 1850, p. 72.

^t TROUSSEAU, 1861.

^u W. BUDD, 1856, 1859, 1861.

endorsed by Sir Thomas Watson in the last edition of his *Lectures on Medicine* (1871).

The question is of such importance, that a consideration of the chief arguments in favour of the contagious nature of the disease will be advantageous.

a. When one individual is attacked, many other cases often follow in succession in the same house or district. Facts of this nature are common in both town and country districts; but undue stress has been laid on them by the advocates of contagion. A moment's reflection shows that such cases are as readily explicable on the supposition that the disease has a local origin, as upon that of contagion. Although in some instances the cases follow one another, so as to favour the idea that the disease has been communicated by one patient to the other, the circumstances in others are opposed to such a view. Occasionally, many persons residing in one house, even as many as twenty or forty, are seized all at once, so as to suggest the suspicion of poisoning, and yet no source of contagion can be traced. On the other hand, the interval between the different cases is sometimes too long to admit of explanation on the theory of contagion. I have met with several instances where single cases of enteric fever have originated in the same house year after year, without any traceable importation of the poison on any occasion. For instance, six cases were admitted from a single house into the London Fever Hospital; one in June, 1849; one in October, 1851; one in February, 1854; one in November, 1855; one in November, 1856; and a sixth in July, 1857. Moreover, the order of succession of the cases has often no relation to the degree of exposure to the supposed source of contagion. Piedvache mentions a remarkable instance of enteric fever in a boys' school at Dinan. The boy first attacked was nursed by his fellow-pupils, more than twenty of whom passed the night with him during his illness and used no precaution against the contagion. Not one of the boys thus exposed took the fever; but the second case occurred nineteen days after the death of the first in a boy who had no communication with the first patient, who had never entered his room, and who slept in a remote part of the building.^v

b. Enteric Fever is said to be communicated to the nurses and other attendants on the sick. Many instances might be cited

^v PIEDVACHE, 1850.



+ In 1834 Chomel stated that he had only
known 5 (out of 117 admitted)

See *Guinean Repository*, p. 110.

where nurses, who have gone to attend on patients suffering from enteric fever at their own homes, have been attacked shortly after their arrival; but, on the supposition that the disease may have a local origin, the nurse is exposed to the poison equally with the residents, and, in fact, the recent date of her exposure renders her more liable. I have never known nor heard of a case, where the fever has been communicated to the medical attendant not residing in the infected house, and Piedvache makes a similar statement.^w It is, therefore, necessary to search for evidence derived from what occurs when patients are treated in different localities from those in which they contracted the disease.

Hospital experience lends little support to the doctrine of contagion. One of the chief arguments for the contagious character of typhus was derived from the liability of hospital attendants to suffer; but it is universally admitted to be a very rare occurrence for the nurses or medical attendants of hospitals to contract enteric fever from the sick under their care. Andral denied that it was ever communicated to the medical attendants in a hospital, or to patients occupying adjoining beds.^x During six years, not a single case of contagion occurred in the *clinique* of M. Bretonneau, at Tours.^y Louis, in his extensive experience at the hospitals of La Pitié and the Hotel-Dieu, met with only three instances where the disease originated in these institutions.^z ~~During nineteen years, Chomel only knew four cases contracted in the wards of the Hotel-Dieu;~~^a and Piedvache, as the result of his extensive research, declared that in France such cases were quite exceptional.^b Dr. Wilks informs me that he has never known a nurse in Guy's Hospital contract enteric fever. In 1856 Dr. Peacock remarked that he had never known enteric fever communicated to the nurses or attendants at St. Thomas's Hospital;^c while the only instances of enteric fever contracted in all the General Hospitals of London, which Messrs. Bristowe and Holmes could discover in their official enquiry in 1863,

^w PIEDVACHE, 1850, p. 93.

^y DE CLAUVERY, 1845, p. 844.

^a CHOMEL, 1834.

^x ANDRAL, 1846, i. 485.

^z LOUIS, 1841, li. 374.

^b PIEDVACHE, 1850, p. 84.

^c PEACOCK, 1856. In 1865 Dr. Peacock published the cases of two nurses who caught enteric fever in the temporary St. Thomas's Hospital. Both had nursed enteric cases, but Dr. P. doubted if the disease had arisen by infection. The ground on which the temporary hospital was built had no proper system of drainage, and the nurses slept on the ground floor. He repeated his original statement that he had never known an unequivocal instance of the spread of enteric fever in any hospital by infection. *Lancet*, Feb. 11, 1865.

were those of two nurses in the Royal Free Hospital.^d After five years' experience in the City of Glasgow Fever Hospital, Dr. J. B. Russell thus writes: 'As an interesting contrast with our experience of typhus, I may say that no case of enteric fever has ever arisen either among the staff, or among the patients beside whom cases of enteric fever are treated.'^e

During twenty-three years (1848-70), 5,988 cases of enteric fever were admitted into the London Fever Hospital, but only 17 residents in the hospital contracted the disease, and most of them had no personal communication with patients sick of enteric fever. Of the 17 cases, 9 were nurses, only 4 of whom were employed in the enteric wards, 1 was a laundress, 1 a medical officer, and 6 servants residing in a building detached from all fever wards. Twelve of the 17 cases occurred subsequently to 1864, when various extensions of the hospital buildings led to serious derangements of the drainage, and on more than one occasion the occurrence of several cases in succession in the hospital was found to coincide with the smallest number of patients with the disease in the wards, and with defects of drainage, the removal of which at once arrested any further spread of the disease. During the same period of twenty-three years, 12 patients admitted with other diseases contracted enteric fever in the hospital; 4 of these patients were admitted with typhus, and 8 with scarlatina; 8 (2 typhus, and 6 scarlatina) of the 12 patients were admitted subsequently to 1863. But the most remarkable fact is what follows. Since 1861 it has been the practice to classify the patients in the Fever Hospital in this way. The typhus, relapsing, and scarlatina patients have been kept in distinct wards, whereas the patients suffering from enteric fever have been treated in the same wards with the many patients sent to the hospital, who have not been the subjects of any form of contagious fever. The two classes of patients have remained

^a *Sixth Report of Med. Off. of Privy Council*, p. 539. They mention several instances of provincial hospitals in which enteric fever seemed to spread by contagion. The chief of these was the Bath Hospital, in which four cases of enteric fever originated in 1862. An account of this outbreak was subsequently published by Dr. Goodridge, one of the physicians to the hospital, who showed that a quantity of tow had been thrown into the pan of the water-closet on the floor where the patients contracted the fever, which blocked up the waste-pipe and caused an accumulation of soil. One of the patients who took the fever had been in a surgical ward into which cases of enteric fever were not admitted, but all four had been exposed to the effluvia from faecal fermentation. The defects in the drainage were rectified, and although cases of enteric fever continued to be admitted, no fresh cases occurred in the hospital. *Lancet*, Oct. 22, 1864.

^e *Report for 1870.*



together, both during the acute stage of their maladies and in convalescence, in most instances for several weeks. The same night-chairs have been used by both classes, and the employment of disinfectants has been exceptional. The result has been this. During nine years 3,555 cases of enteric fever have been treated along with 5,144 patients not suffering from any specific fever; not one of the latter has contracted enteric fever. My experience, in fact, has led me to the conclusion that when enteric fever originates in a hospital, as a rule there is something radically defective in the sanitary arrangements,^f and that either the air or drinking water is polluted with decomposing excrement. In rare instances, as in those which follow, the attendants alone suffer, but when this happens, it is a fit subject for enquiry whether the poison be not generated in the decomposing alvine evacuations, instead of emanating directly from the bodies of the sick.

1. In 1858, one of the nurses of King's College Hospital, between 25 and 30 years of age, contracted well-marked enteric fever and died. Immediately before her seizure, she had been engaged in nursing a patient ill of the disease. None of the other nurses nor of the patients in the hospital caught the fever, which therefore did not seem to have had a local origin.

2. A similar case is recorded by Gendron. On November 5th, 1826, a female, aged 20, was brought to the hospital of Château-du-Loir. She was then in the third week of an attack of 'dothienenteritis,' of which she died on December 1st. Immediately after her death, her nurse, a female aged 45, was attacked with the fever, no other cases of which occurred in the hospital.^g

3. Some years ago, two young men met in London. A came from the Isle of Wight, where there was no fever; B came from a village in Cambridge, where enteric fever was prevalent. B was ill at the time of meeting. Both proceeded to Edinburgh, where B had a well-marked attack of enteric fever. A lived in the same house and nursed B, and he also took the fever, although all the other residents in the house escaped.^h

4. At Windsor, in 1858, Emily C—— was brought home ill of enteric fever to her father's house. She was nursed by her sister Amelia, aged 12, who slept in the same room on a mattress beside her sister's bed. At the end of a fortnight, Amelia was seized with the fever, which ran a severe course and presented all the characteristic symptoms, including the lenticular spots and diarrhoea. Enteric fever was certainly prevalent in the neighbourhood; but, though several of the residents in the same house were of the age most liable to it, Amelia C——, who alone attended on her sister, was the only one who took the fever.ⁱ

^f See also MACLAGAN, 1867.

^g PIEDVACHE, 1850, p. 50; see also p. 52.

^h Communicated by Dr. BUCHANAN.

ⁱ MURCHISON, 1859 (3), p. 311.

c. Persons labouring under enteric fever occasionally transport it into localities where it was before unknown, but where it then spreads from them as from a centre. Although many of the cases appealed to in support of this argument have probably been examples of typhus, or of some other fever,^j there are unequivocal instances of enteric fever propagated in the manner described. It is true that such occurrences are exceptional, and that the number of cases where the disease is introduced into a new locality without spreading far exceeds that in which it is propagated. More than forty instances have come under my notice in private practice where persons have come to a house ill with enteric fever, but in two only of the entire number was there any evidence of the disease spreading, and in one of the instances there were some doubts as to the individual who was supposed to have imported the disease being really ill at the time of arrival. The fever is occasionally believed to be introduced into a house by a newly-arrived person, when it really has a local origin from which the stranger naturally suffered first (see p. 456). In several instances of this sort, I have ascertained that the stranger was perfectly well at the time of arrival. In the following illustrations, however, the disease appeared to spread in a circumscribed locality, immediately after the arrival of an infected person.^k

they 1. In 1826, an outbreak of enteric fever occurred in the Military School of La Flèche, in France. It commenced in July, and did not cease until 109 boys were attacked. The school was broken up, and boys who were not ill were sent to their own homes in distant parts of France; 29 were taken ill after reaching their homes, and 8 communicated the disease to their families.^l

2. Enteric fever broke out in a family living in an isolated country house on the top of a hill, in France. Three nurses were called in to tend the sick. All three took the fever, and all three communicated it to their own families, residing in a village at a long distance from the source of infection.^m

3. Dr. W. Budd has recorded an outbreak of enteric fever which occurred at North Tawton, Devon, in autumn, 1839. During the prevalence of the fever, it so happened that three persons left the place after they had become infected, and all three communicated the disease to one or more of the persons by whom they were surrounded in the

^j For example, at Windsor in 1858, most of the cases popularly reported as proving the contagious character of enteric fever, proved to be cases of scarlet fever, which was very prevalent at the same time.

^k Others are reported by the writers already referred to (p. 459) and also by REEVES (1859); SIMON (1861); and TROUSSEAU (1861).

^l BRETONNEAU, 1829, p. 70.

^m PIEDVACHE, 1850, p. 60.

new neighbourhoods to which they had removed, although in each of the three new localities there had been no cases of fever previous to their arrival.ⁿ 7/8

4. In 1843 the village of North Boston, Co. Erie, New York, consisted of 9 families, or 43 persons. On Sept. 21st a stranger from Massachusetts took lodgings in the hotel, having been ill for several days before with fever, of which he died in the hotel on Oct. 19th. Diarrhoea and low delirium were prominent symptoms of his attack. Between Oct. 19 and Dec. 7, 28 of the 43 inhabitants took enteric fever, of whom 10 died. An autopsy in one case revealed characteristic typhoid ulcers in the ileum. The person first attacked was a son of the innkeeper, and of this family no fewer than 7 took the fever and 3 died. Only 3 of the 9 families escaped; 2 of the 3 lived at some distance from the tavern. Between the one family living near the tavern which escaped and that of the innkeeper there was a feud, and consequently the former did not draw water from the innkeeper's well; but dug a well of their own. The other 5 families living close to the tavern (and one of those at a distance in which there was no fever) used the tavern water, which was at first believed to have been intentionally poisoned. Dr. Flint was of opinion that the fever was not due to the water at all, but to personal intercourse with the sick stranger, but similar occurrences since brought to light make it most probable that the water was at fault.^o

5. In 1858, a servant ill of enteric fever was removed from Windsor to her home at Cippenham, four miles distant. Three weeks afterwards, her father and sister took the disease, although no other cases had occurred at Cippenham. Another girl ill of the fever was removed to Bray, some miles distant. Shortly after, her two sisters took the fever, although no other cases had occurred at Bray previously.^p

6. In October 1864, enteric fever made its appearance at Balletheron, a farm-house at the southern base of the Sidlaw Hills, six miles to the north-east of Dundee. A maid-servant ill with the fever was conveyed thence to her father's house in the Glen of Ogilvie, on the other side of the hills. Within a few weeks, and apparently consequent on the introduction of this one case into a thinly populated and healthy glen, 17 other cases sprung up in persons who were in the immediate vicinity of those previously affected.^q

With such facts before us, it is impossible to deny that enteric fever is in some way communicable by the sick to persons in health. Before proceeding to discuss whether this poison be ever generated independently, it may be expedient to allude to some of the laws by which its action appears to be regulated.

I. *Mode of Communication.*—Although enteric fever is com-

ⁿ BUDD, 1859, p. 29.

^p MURCHISON, 1859 (3), p. 311.

^o FLINT, 1852, p. 377.

^q MACLAGAN, 1867 (NO. 2). 8

municable, my experience is entirely opposed to the view that it is contagious in the strict sense of the term. Visiting, or contact with, the sick is neither sufficient nor necessary to produce it, and it is never propagated by a third person.*

As in dysentery and cholera, the alvine dejections appear to constitute the chief, if not the sole, medium of communication. This view, which has been taught at Munich for thirty years by Professor (von F.) Gietyl,^s and which was first explicitly published by Canstatt in 1847,^t and which has been ably advocated by Dr. W. Budd and many authorities in this country, accounts for some of the differences of opinion on the contagiousness of enteric fever, as the disease would cease to be communicable when care is taken at once to remove and destroy the alvine evacuations. But though enteric fever may be propagated by the stools of the sick, it does not follow that the sick give off from their bowels a specific virus like that of small-pox, as has been commonly argued. All evidence is in favour of the view that the *fresh* evacuations are harmless (see p. 463), and that the poison is developed during their putrefaction, in other words, that what has been demonstrated in cholera, both clinically and experimentally, holds good in the allied diseases, enteric fever and dysentery. The poison developed in the stools is either: *a*, propagated through the atmosphere: or, *b*, finds its way into the drinking water, and so enters the system by the digestive tract. W. Taylor^u and Ballard^v have shown that enteric fever is sometimes propagated by means of polluted milk, and several similar instances have been met with by other observers.^w +

* A contrary opinion has been expressed by some writers. See, for example, DE LA HARPE, 1867. Dr. Clifford Allbutt has recently put on record what seemed a striking proof of communication by contact. A nurse came to her master's house in the early stage of enteric fever, and on the night of her arrival, and on that night only, slept with a little girl of the family, who was seized with a severe attack of enteric fever four days afterwards, no other person in the house being attacked (*Brit. Med. Journ.* May 7th, 1870). The case was not under Dr. Allbutt's care, but I am indebted to him for the opportunity of obtaining some further particulars respecting it which deserve to be mentioned. The nurse had only left her master's house in Oxford seven days before her return, and two days before she fell ill, and she went to a house in Cheltenham, in which there was no fever; while nine days after her return to Oxford her master's under-nurse also took the fever. There is no proof, then, that the nurse imported the fever from Cheltenham, and more probability that its cause was in Oxford, although careful enquiry failed to discover it.

^s F. VON GIETL, 1860, p. 2, and 1865.

^t *Spec. Path. und. Therap.*, 2nd ed. vol. ii. p. 572. 'Wahrscheinlich sind die Exhalationen des Kranken, seine Excremente, vielleicht die typhösen Aftergebilde im Darne, die Träger des Contagiums.' Riecke, in 1850, recorded several instances of outbreaks of enteric fever traceable to drinking water polluted with sewage (see RIECKE, 1850, p. 44).

^u TAYLOR, 1858.

^v BALLARD, 1871.

^w *Lancet*, 1873, i. 284; and *Brit. Med. Journ.* 1873 i. 291.

For good illustration of Typhoid fr. polluted water,
see "Eine Typhus epidemic in der Kaiserin zu
Sulzbürg in Januar 1877 Centralblatt f. d. Med. Wien
1878. No 40" referred to in "19th Century" Jan. 1879.

As to effect of Intermittent Water Supply in causing Typhoid
at Geyers in 1875. See Dr. Buchanan's Rep. in Rep. of
Med. Off. of Privy Council No. VII. 1876.

* See also Taylor 1872, Russell, 1873. & London epidemic
of 1873.

Can milk convey Typhoid otherwise than
by a admixture of polluted water?



2. *The distance to which the poison can be transmitted.*—Piedvache and other writers have maintained that the poison of enteric fever ceases to take effect at a very short distance from the sick, and that it is always inert when the atmosphere around the sick is constantly changed; but it is obvious, that if the poison be contained or developed in the stools, it may take effect at a distance from the persons from whom it is derived, through the medium of drains, drinking water, or milk.

3. *Fomites.*—Bretonneau and Gendron believed that the poison of enteric fever could adhere to the clothes and bedding of the sick, and that the disease might thus be propagated. Gendron, who was an exclusive contagionist, cited several instances, where he believed that the disease was transmitted by bedding after an interval of many years;^{*} but in these cases, the cause was perhaps localized in the water or sewage of the house, and not in the bedding. At the same time, inasmuch as the stools of enteric patients may putrefy and become poisonous in a drain or in drinking water, there is no reason why similar changes should not take place in the excrement discharged into clothes or bedding, or why these articles should not in this way come to propagate the disease. Thin,[†] Dé la Harpe,[‡] and other observers have recently recorded illustrations of this mode of propagation, and the following fact has been communicated to me on excellent authority:—

In 1859 the wife of a butcher residing in the small village of Warbstowe, situate between Launceston and Camelford, on the Cornish moors, travelled to Cardiff in Wales, to see her sister, who was ill and soon after died of 'typhoid fever.' She brought back her sister's bedding. A fortnight after her return to Warbstowe, another sister was employed in hanging out these clothes, and soon after was taken ill with 'typhoid fever,' which spread from her as from a centre. The woman who had been to Cardiff never took the fever herself; there had been no cases in Warbstowe previous to her return; neither were there any cases in the neighbouring villages, either before or after.

4. *Period of Incubation.*—Few conclusive facts bearing on the period of incubation of enteric fever have been recorded. This is accounted for by the difficulty there often is in deciding when an attack of enteric fever has really commenced; and by the circumstances that the disease is rarely contracted in hospitals, and rarely spreads when it has been imported into a

^{*} GENDRON, 1834; PIEDVACHE, 1850, p. 119.

[†] THIN, 1865.

[‡] DE LA HARPE, 1867, p. 26.

(p. 464) healthy locality. An appeal for information on this point to several physicians at the head of large fever hospitals has led to negative results; and in my own practice I have only met with two cases throwing any light upon the matter, and in these all that could be said was that the period of incubation was not longer in one case than 21 days, and in the other than 14. The following facts and opinions have been published.

8) Lothholz, in 19 cases at Jena found the period of incubation to be between 18 and 28 days.^a Seidel, in one case, found it to be at least 12 days.^b Zehnder, from observations made at Zurich, concludes that it is usually between 10 and 20 days, but that when there is a strong predisposition, it may not exceed 24 or 48 hours.^c De la Harpe infers from 21 cases that it varies from 6 days to 11 weeks! but none of his observations fix the duration precisely.^d Dr. W. Budd states that a large number of cases has led him to the conclusion that it varies from 10 to 14 days.^e When the school of La Flèche was broken up on account of an outbreak of enteric fever (see p. 464), of the 29 boys who fell ill with the fever at their own homes, all were seized some time during the second week after their arrival. From Buchanan's observations it would appear that in a large number of cases at Guildford in 1867 the latent period was 11 days.^f Knevenagel has recorded an interesting case, in which it was exactly 8 days.^g Lastly, there is evidence that the period of incubation may be extremely short. Griesinger relates 3 instances in which the attack commenced on the day following exposure to the infection.^h In the outbreak in a school at Clapham, of which the details will be given presently, 20 out of 22 boys were seized within four days of exposure to the cause, (see p. 472). Under such circumstances the disease is usually ushered in severely with vomiting and purging, often attacks at once many persons residing in the same house, and is often fatal, and hence many outbreaks of enteric fever have at first excited suspicions of poisoning. Several instances will be referred to presently, where, as in the outbreak some years ago in the royal family of Portugal,ⁱ the symptoms of enteric fever were at first ascribed to criminal or accidental poisoning. From the evidence here collected it

^a Lothholz, 1866. ^b *Jenaische Zeitsch. f. Med.* iv. 480. ^c Pamphlet, 1866.

^d De la Harpe, 1867.

^e Budd, 1856, p. 618.

^f *Tenth Rep. Med. Off. of Privy Council*, 1867, p. 40.

^g Knevenagel, 1869.

^h Griesinger, 1864, p. 149.

ⁱ See *Brit. Med. Journ.* Jan. 4, 1862.

D. Conjecture thinks this is incompatible
with my observations at p. 468. that I had
never known or read of the medical
attendance being entirely gone.

Vol. 9. 1874. I. 657.

would appear that: 1. The period of incubation of enteric fever is most commonly about two weeks; 2. Instances of a longer duration are more common than in typhus or relapsing fever; 3. It is often less than two weeks, and may not exceed one or two days. It has been suggested that the period of incubation may be shorter when the poison is imbibed¹ with the ingesta than when it is inhaled; but in the Clapham case, and in other instances of very short incubation which might be quoted, the poison was inhaled.²

5. *Stage at which the disease is most communicable.*—There are no data for forming an accurate opinion on this point. According to Gendron and other writers, the disease is most contagious at its advanced stage; but this conclusion is merely founded on the circumstance that the first patient in a house has occasionally been ill for two or three weeks before the others are attacked. It would be important to determine at what stage the stools are most virulent.

There is no proof that enteric fever can be communicated by the dead body. Putegnât ~~was inclined to attribute his own attack to the autopsy of a fatal case;~~ ~~It is true that he was seized a few days after the autopsy;~~ but he had attended both the patient and her mother during their illness.^k Féron cites the instance of a woman who went a distance of two miles to lay out the body of a little girl who had died of the fever, and who was herself seized immediately after; but the circumstance is equally explicable on the supposition of some local cause in the house where the girl had died.¹

6. *Immunity from second attacks.*—It is generally believed that one attack of enteric fever confers an immunity from subsequent attacks.^m This opinion is founded on observations of a two-fold nature. First, on questioning patients suffering from the disease, it is rarely ascertained that they have had a previous attack; former attacks of 'fever' have usually been of a different nature. Secondly, several remarkable instances have been recorded, particularly by Gendron and Piedvache, where a second outbreak has occurred in the same house or locality after an interval of many years, and where the fever has attacked almost every person who had not the disease

^j For further details of the cases here quoted see MURCHISON, 1872.

^k PUTEGNÂT, 1838, p. 856.

¹ FÉRON, 1840, p. 105.

^m BRETONNEAU, 1829, p. 58; GENDRON, 1834; CHOMEL, 1834, p. 333; LOUIS, 1841, ii. 370; PIEDVACHE, 1850, p. 103; JENNER, 1849 (I), 38; W. BUDD, 1859, p. 56; BARTLETT, 1856, p. 106.

it is worth mentioning that

previously, but spared those who had been attacked in the first visitation.

At the same time, well-authenticated instances of persons contracting enteric fever a second time are more common than is generally believed. Several have come under my own notice in which both attacks have occurred subsequently to puberty, and many more in which a patient who had passed through 'infantile remittent fever' got an attack of enteric fever in adolescence. Trousseau records two examples of a second attack; one that of a woman in whom there was an interval of four years between the two attacks; the other, that of a girl who had a severe attack at the age of 12, and a second equally severe a year afterwards.ⁿ Piedvache mentions the case of a girl who had an attack in January, 1841, at the age of ten, and a second attack in July, 1849.^o Three unequivocal examples of a second attack are reported by Michel;^p three by Bartlett, after an interval of only one year; one by Paul, after an interval of three years;^q and four by Dr. W. Budd.

2. Independent Origin.

Admitting that enteric fever is, under certain circumstances, communicable, it is, in my opinion, equally true that many cases have an independent origin. Of the patients admitted into the London Fever Hospital, I have rarely been able to trace the disease to contagion. Of 1,576 cases, it was ascertained that 204, or 13.72 per cent., attributed the disease to contagion, but only because other cases had occurred in the same house (see page 460). Although in large towns it may be difficult to exclude the possibility of contagion, on turning to the history of circumscribed epidemics in country districts, it is found to be often impossible to attribute the first appearance of the disease to contagion. It is not uncommon for the inmates of an isolated country house to be seized with enteric fever, although no case has occurred within many miles, and there is no evidence of importation of the poison. In fact, if we except Bretonneau, Gendron, and our countryman, Dr. W. Budd, it has been almost universally believed by those who have had much experience of the disease, that a large proportion of the cases of enteric fever are independent of contagion. Even Gendron admitted that, after the most rigid investigation,

ⁿ *Clin. Med. Syd. Soc. Transl.* iii. 50.

^p MICHEL, 1859, p. 297.

^o PIEDVACHE, 1850, p. 103.

^q *L'Union Méd.* 1870, i. 587.

Lindworm has not infrequently met with
second attacks of Enteric Fever, after an interval
of years. Der praktische Arzt, 1873, N.º 9,
gutes in Positionen, Jan. 1874.

Bürmer, Ueber Entstehung und Verbreitung
des Abd. Typhus. - 1873.

he was quite unable to account for the first cases in certain localities, and he added that he had met with several isolated cases of which the cause was unknown to him.* Piedvache also states that, in France it is often impossible to trace the first cases of a circumscribed epidemic to contagion, and records many instances, where it appeared certain that the persons attacked had not directly, or indirectly been exposed to contagion. His conclusions on this point are as follows: 'Je dirai même qu'il est très probable, et je crois même certain, que des fièvres typhoïdes, dans quelques circonstances, se déclarent à la fois en nombre assez considérable pour constituer une épidémie indépendamment de la contagion.'^s Dr. Wood, of America, remarks: 'But against the opinion of its ordinary contagiousness is the fact, that it is constantly springing up in isolated cases, without any possible communication.'^t 'La transmissibilité,' says Jacquot, 'est la règle pour le typhus, l'exception pour la dothiéntérie.'^u Trousseau, although a decided contagionist, admits that in many instances, its origin is spontaneous.^v Lastly, Niemeyer, writing in 1867, observed: 'I must deny that the recent assertions, that abdominal typhus spreads solely by contagion, have been proved, or even rendered very probable, by the facts adduced.'^w

Until a few years ago, it was not attempted to account for the origin *de novo* of enteric fever. Chomel remarked: 'Les causes de la fièvre typhoïde sont enveloppées de la plus grande obscurité.'^x Dr. Stewart observed: 'With regard to the producing cause of typhoid fever, all is vague and uncertain.'^y Piedvache spoke of its etiology as 'enveloped in obscurity'; and in March, 1858, Dr. Tweedie stated, in his lectures delivered before the Royal College of Physicians, that its causes were 'obscure and unknown.'

Air and drinking water polluted with decomposing sewage and other forms of putrefying animal matter had long been regarded as causes of fever,^z but it had not been shown that the fever thus produced differed from that resulting from other causes. In an essay presented to the Royal Medical and Chirurgical Society, in March, 1858,^a I endeavoured to prove that fever arising from these causes was always enteric fever,

* GENDRON, 1834, p. 13.

^t WOOD'S *Pract. of Med.* 4th ed. i. p. 389.

^v TROUSSEAU, 1861, p. 179.

^x CHOMEL, 1834.

^z See LASSÔNE, 1749; PRINGLE, 1752, pp. 324-8; *Report of Poor Law Commissioners*, 1842.

^s PIEDVACHE, 1850, p. 137.

^u JACQUOT, 1858, p. 306.

^y *Text Book of Pract. Med. Amer. Transl.* ii. 572.

^w STEWART, 1840, p. 295.

^a MURCHISON, 1858 (No. 1).

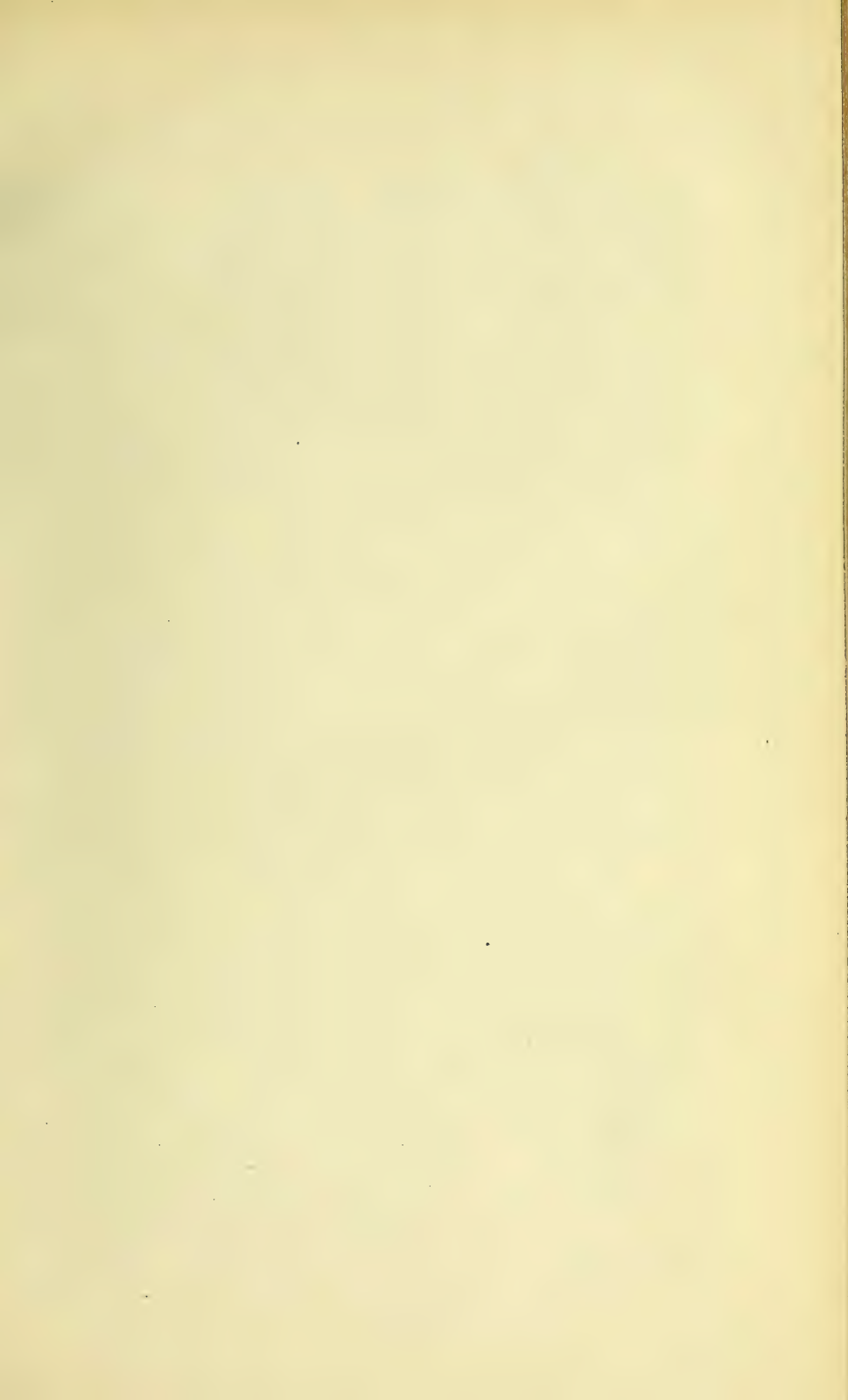
and never typhus or relapsing fever; and to show that this mode of origin explained why enteric fever was endemic in many places, but often epidemic in circumscribed localities; why it attacked the rich as well as the poor; why it occurred in isolated country-houses as well as in large towns; and why it was most prevalent in autumn and in warm seasons. Subsequent observations have tended to confirm the opinions then expressed. A reference to some of the most important facts bearing on the question may be of service.

In August 1829, 20 out of 22 boys at a school at Clapham, within three hours, were seized with fever, vomiting, purging, and excessive prostration. One other boy, aged 3, had been attacked with similar symptoms two days before, and had died comatose in 23 hours; another boy, aged 5, died in 25 hours; all the rest recovered. Suspicion was entertained that they had been poisoned, and a rigorous investigation ensued. The only cause which could be discovered was, that a drain at the back of the house, which had been *choked up for many years*, had been opened two days before the first case of illness, cleaned out, and its contents spread over a garden adjoining the boys' play-ground. A most offensive effluvium escaped from the drain, and the boys had watched the workmen cleaning it out. This was considered to be the cause of the disease by Drs. Latham and Chambers, and by others who investigated the matter, and also by Sir Thomas Watson. The morbid appearances in the two fatal cases were described as 'like those of the common fevers of this country.' Peyer's patches and the solitary glands of the small and large intestines were enlarged like 'condylomatous elevations,' and, in one case, the mucous membrane over them was slightly ulcerated. The mesenteric glands were enlarged and congested.^b It may be objected, that the course of the disease was more rapid than what ordinarily characterizes enteric fever; but this circumstance was accounted for by the intensity of the poison. Cases of undoubted enteric fever will be alluded to hereafter, in which violent delirium occurred on the first or second day; and Trousseau records a case with similar symptoms to those of the Clapham cases which was fatal in less than four days.^c Several cases of enteric fever resembling in every way those observed at Clapham have also come under my own notice. One of these may be quoted, as my opinion respecting it was corroborated by Dr. A. P. Stewart.

In June 1861, a case similar to those at Clapham came under my observation. (See Case LVIII.) A girl, aged 9, was seized with febrile symptoms, vomiting, purging, and intense headache, followed by acute delirium, and died 47 hours from the commencement of her illness. After death, the characteristic lesions of enteric fever in an

^b See *Bibliography*, 1829; also WATSON, *Pract. Phys.* 3rd ed. ii. 759.

^c TROUSSEAU, 1861, p. 168. Boudet records a case fatal on the 6th day, in which deep ulcers with adherent sloughs were found in the ileum (BOUDET, 1846).



early stage were found in the bowels. Accompanied by Dr. Stewart, I visited the rooms, over a stable, occupied by this girl's family. The privy was in the stable, and drained into a cess-pool near the door, which had become *choked up*. Over the cess-pool was an open grating, by which the stable drained into it, and from which the most offensive smells had issued since the beginning of the warm weather; so offensive, that the horses had sometimes to be removed. The girl had been playing close to this grating at the time of her seizure. The cess-pool did not communicate with the public drain, and no other cases of fever had occurred in the mews.

A remarkable instance of a circumscribed outbreak of fever was recorded by Sir R. Christison in 1846. It occurred in an isolated farm-house in the thinly-peopled county of Peebles, N.B. Every one of the 15 residents was seized with fever, and 3 died. Many of the servants who worked during the day at the farm were also affected, but none communicated the disease to their families, who did not visit the farm. There was no evidence that the disease was imported from without, and the only explanation of the outbreak was, that 'the drains and sewers were found *all closed up and obstructed* with the accumulated filth proceeding from the privies and farm-yard,' the effluvia from which were very offensive. Although enteric fever had not, at that time, attracted much attention in Scotland, Sir R. Christison observed with regard to this outbreak, that its 'want of resemblance to the habitudes of ordinary epidemic typhus struck the attention as something very remarkable;' and that 'the leading symptoms were those of great gastro-intestinal derangement,' so much so, that suspicions of poisoning were entertained. Moreover, the lengthened duration of the cases, the clearness of the intellect, and the absence of great prostration, oppression, and delirium, leave no doubt that the fever was enteric. The absence of diarrhoea and abdominal tenderness noted in these cases is not incompatible with enteric fever.^a

About Easter, 1848, a formidable outbreak of fever occurred in the Westminster School and the Abbey Cloisters; and for some days there was a panic in the neighbourhood respecting the 'Westminster Fever.' No case of fever had occurred in the Abbey or Cloisters for three years, and there was no evidence of its having been imported. Within little more than eleven days it affected thirty-six persons, all of the better class; and in three instances it proved fatal. Shortly before its first appearance, 'there occurred two or three days of peculiarly hot weather,' and a disagreeable stench, so powerful as to induce nausea, was complained of in the houses in question. It was found that the disease followed very exactly in its course the line of a foul and neglected private sewer or immense cess-pool, in which faecal matter had been accumulating for years *without any exit*, into which the contents of several smaller cess-pools had been pumped immediately before the outbreak of fever. This elongated cess-pool com-

^a CHRISTISON, 1846.

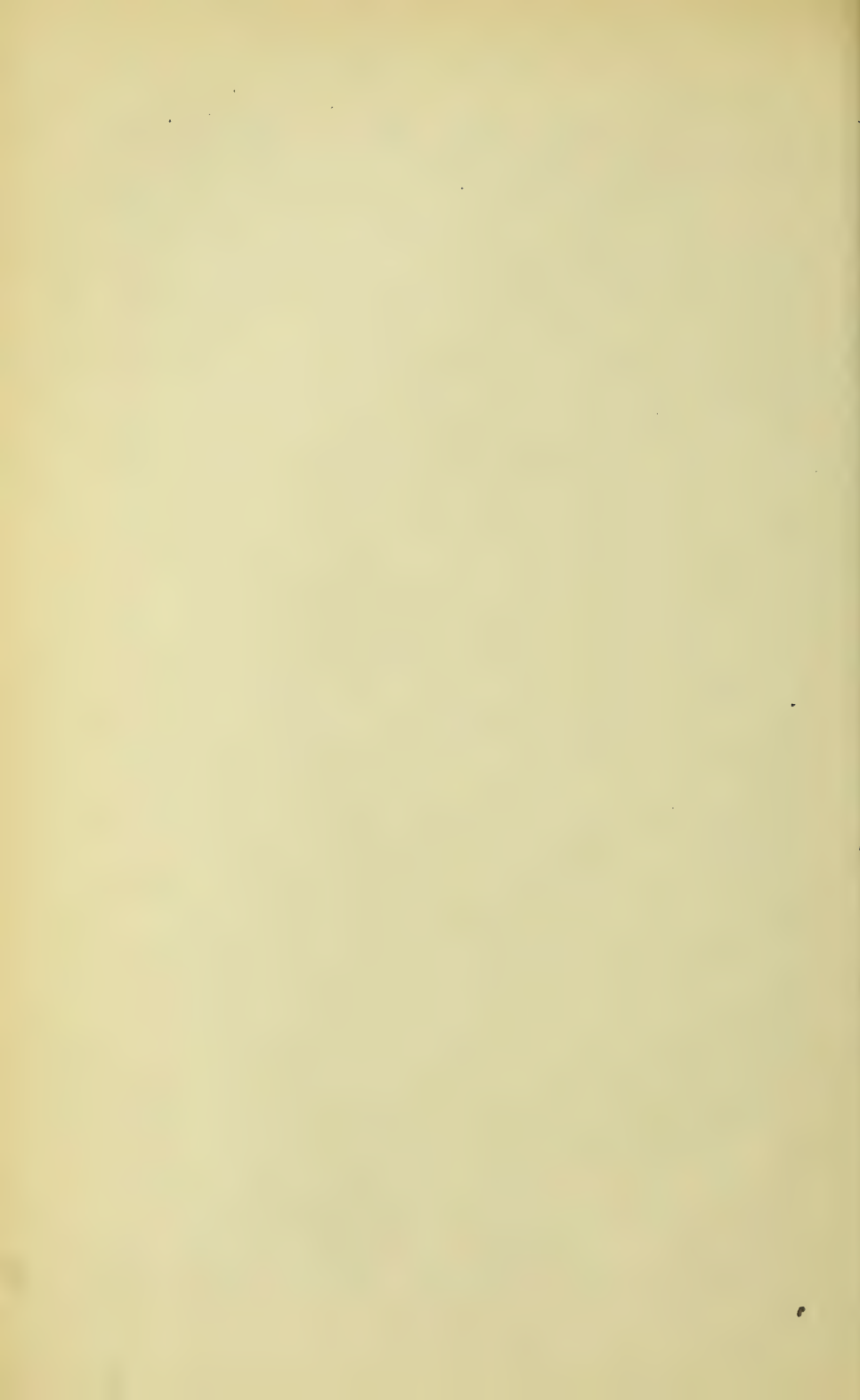
tr. municated by direct openings with the drains of all the houses in which it occurred; the *only* exception was that of several boys who lived in a house at a little distance, but who were in the habit of playing every day in a yard, in which there were gully-holes opening into the foul drain. The Metropolitan Sanitary Commission gave it as their decided opinion, that the epidemic 'arose from the bad state of the sewers and drains of the precinct, and especially from the foul condition of large the sewer described. Sir Thos. Watson also expressed his belief that the 'Westminster Fever' was due to the effluvia from this drain, and in the third edition of his Lectures quoted the case as a 'startling proof' of the 'noxious power' of such emanations; but he did not consider that the cases were Continued Fever at all. He saw, however, only one of the cases; and he expressed the above opinion before he recognized enteric fever as distinct from typhus. Dr. Todd, Dr. Fincham, Dr. Southwood Smith, Mr. M'Cann, were the other medical men consulted. Dr. Todd, who saw five or six of the cases, informed me that they were unquestionably examples of enteric fever. Dr. Fincham, who, by the way, also saw the case alluded to by Sir Thos. Watson, wrote to me, that all the cases which he saw 'were unquestionably examples of typhoid fever. In all, the bowel-complication (the diarrhoea etc.) was well marked. I believe that every case that occurred exhibited the same symptoms.' The same opinion was expressed by Dr. Southwood Smith and Mr. M'Cann. Lastly, two of the cases were admitted into the London Fever Hospital; they were diagnosed as 'Typhoid Fever,' while their symptoms were recorded and exactly corresponded with those of enteric fever, including the lenticular rose spots.*

c/ During 1857, 6 policemen were admitted into the London Fever Hospital from the Peckham police-station, with enteric fever: 3 in June, 1 in July, 1 in August, and 1 in September. The first three patients were seized simultaneously during the first week of June. On inquiry, it was stated that there was no defect in the drainage of the building, and that the water-closets opened into the drains and were well trapped. Yet the men affirmed that they had often complained of dreadful odours in the room in which they sat, and I applied to the officer of health for the district, to have the building carefully examined. The result was the discovery that one water-closet on the ground-floor emptied itself, not into the main drain, *with which it had no connection*, but into an old well, immediately underneath the passage adjoining the room in question. Here an accumulation of upwards of ten feet of soil had been going on for years; and the top of the well was merely covered by the flag-stones of the passage. The cess-pool was removed, and the fever ceased.

A few years ago, a remarkable outbreak of enteric fever occurred in the Boys' School attached to the Colchester Union, for the particulars of which I am indebted to Mr. Laver. 'Twenty-eight boys (out of about 36) were attacked; but the first and worst cases were those

* See *Bibliography*, 1848.

→ See Dr. Collier. Brit. Mus. Z. Nov 30. 1878 p. 796



occupying the forms in the school room marked *a* and *b*; and, amongst these, the first case was the boy in the position marked *1*; the cases among the boys at desk *c* were very slight. All the boys slept in similar rooms, and were similarly treated in other respects.' Mr. Laver had no doubt that the fever was due to emanations from an untrapped drain in the passage, marked *d*. He adds: 'You will see that the boys on the forms *a* and *b* were in the line of draught between the door *e* and the fire *f*, which at that time was burned every day. The drain was trapped, and the fever quickly disappeared.' There was no mistake as to the nature of the fever, which 'answered well to Dr. Jenner's description of *typhoid* fever.' Every possibility of importation appeared to be excluded, although this point was carefully

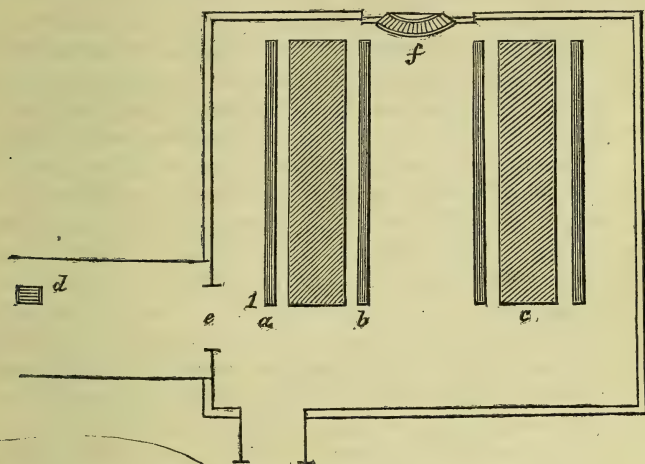


Fig. 1. Ground-plan of Boys' School.

investigated. There were no other cases of fever before or after, in the rest of the Union. 'The boys first attacked had been resident in the Union for years, and had not had a day out for a long time.' The building was situated out of the town, and the drains of the Union only communicated with those of two or three houses of the best class, in none of which had any cases of fever occurred.

In November 1862, I was summoned to a case of enteric fever at Chatham. The house was No. 2 in a newly-built terrace on the top of a hill. The family were the first occupants of the house, and consisted of twelve persons; within a few weeks, 9 out of 12 were seized with enteric fever. During the following month, 3 cases also occurred in the adjoining house, No. 1. No member of either family had been away from home for months before the outbreak, and no person had arrived ill in either house. The first person attacked was the master in No. 2, who had for weeks complained of a bad smell in a cupboard of his dressing-room, which was in the party-wall between the two houses. A bad smell had also for a long time been complained of in No. 1, on each occasion after the closet was used in No. 2. This

closet was built against the party-wall, and the drain-pipes were embedded in the wall, which was only 9 inches thick. The end of the syphon-pipe did not reach the waste-pipe. There was a gap between the two of several inches, into which the whole hand could be inserted. This was plastered round with cement, which was cracked, so that the soil had leaked extensively into the surrounding party-wall. The drainage of this closet was made good, and no fresh cases of fever occurred in either house.

For the particulars of the following case I am indebted to Dr. E. L. Dixon of Preston. In October and November 1862, three servants were seized with enteric fever in a gentleman's house during the absence of the family. The house was detached and on one of the loftiest sites in the suburbs of Preston. There were no other cases of enteric fever at the time in the neighbourhood of this house, and none of the servants had been from home for months. The master of the house was indignant that anything should be suspected to be wrong with the drains; but on examination, the drain-pipe from the water-closet was found to be broken, and the fæcal matter had escaped underneath the kitchen-floor, where it formed a putrefying mass. It had also reached the well which supplied the drinking water and formed a layer at the bottom. The drain-pipe was so destroyed, that all communication with the main-drainage was '*absolutely cut off.*' The drain was restored and no further cases of fever occurred in the house.

The following case is related by Dr. Thin: In 1862, a young lady contracted a severe attack of enteric fever, six weeks after changing her residence at Penicuik. No possible source of infection could be traced. The house was new, and all the previous occupants had been known to the doctor. No one had previously suffered from fever in the house, and there was no other case of fever in or near Penicuik at the time. A bedroom on the ground floor of the house was separated from the water-closet by a stone wall, but a defect in the construction of the sewer permitted a communication with the flooring of the bedroom. The consequence was a decided odour in the room, always worse in damp weather. For this reason Dr. Thin, who had himself been the previous occupant of the house, had removed all furniture from the room and shut it up, but his successor neglected the warning given and used the room.^f

In July 1865, 19 persons were seized with enteric fever at an isolated house situated 800 yards from the village of Ratho, in Scotland, and much farther from any other house. There was not a case of fever in the village at the time, nor within two or three miles of the house, and not one of the persons attacked had been elsewhere exposed to contagion. The well, which supplied all the drinking water of the house was within four yards of a cesspool, into which drained three water-closets. The cesspool was built of rubble pointed with Roman cement, this cement being so much decayed that it could easily be detached from the masonry, so that the soil for a long way round had become

^f THIN, 1865.

app. p. 246.

D. P. v. H. v. H.: Army Med. Dep. Rep. for 1872 - 1874

"D. Hardie gives evidence that the reference of one case to this cause was impossible, & although the other case may have been caused by the same the proof seems to me very uncertain. At all events there is too much doubt to allow the evidence to be used."

I have read again D. Hardie's paper. & am at a loss to see what evidence D. P. refers to. D. H. was of opinion that both cases "originated spontaneously in the person"
Cher. Ap. 1875.

percolated with sewage, with which also the water was proved by analysis to have become impregnated, although to smell and taste it seemed perfectly pure. The drains also beneath the floor of the house had allowed sewage to soak into the soil, which for several feet was quite putrescent.^g

In the autumn of 1865 a medical man in London took a house for his family at Charmouth, near Lyme Regis. Within a few weeks of their arrival at Charmouth, three children took enteric fever. No case of enteric fever had been observed in the village for seven years before, although several cases occurred subsequently. There was no drainage communication between the house occupied by this family and any other house, but close to the surface-well was a privy with its cesspool. Owing to a protracted drought, this well had run almost dry, and the family were drinking water contaminated with sewage, which had percolated the soil from the adjoining cess-pool.^h

In June and July, 1866, two cases of enteric fever occurred in the military prison of Limerick. The first patient had been in prison from May 15 to June 25, and was taken ill the day after his discharge. The second patient was taken ill on July 6th in prison, where he had been since June 13th. No doubt could exist as to the nature of the fever; the first patient died and characteristic lesions were found in his bowels. The military prison is within the enceinte of the barracks, but quite detached. No cases of fever had been known to occur previously either in the prison or barracks, and on careful enquiry no case could be discovered at the time in Limerick. The only cause to which the fever could be traced was emanations from a drain which carried off the water in which the prisoners' clothes were washed, and which was found to be choked with mud for a distance of 26 feet. The weather for some time before had been unusually hot and dry. The drain was cleaned out and remodelled after the occurrence of the second case of fever, and there was no subsequent case.ⁱ

Balletheron is an isolated farm-house at the southern base of the Sidlaw Hills, six miles to N.E. of Dundee. In November 1864, three cases of enteric fever occurred in this farm under circumstances which will best be described in the language of Dr. MacLagan. 'Here then, in an isolated farm-house, situated in a locality in which enteric fever was formerly unknown, we have the direction and course of a drain altered, so that, instead of emptying itself in a field, as formerly, it pours its contents into a stagnant cesspool, and within three weeks afterwards enteric fever breaks out. Can the two events be regarded otherwise than as cause and effect? To my mind it seems impossible to regard them in any other light. The possibility of importation of the disease seemed excluded; all the servants and residents had been

^g SHERIFF, 1865. In reference to this case, Parkes (*Pract. Hygiene*, 3rd ed. p. 73) states on the authority of a relation of the owner of the house, that the fever was imported by a groom, who came ill with it from Dundee. But Dr. Sheriff, who attended the groom, informs me that the groom's illness was not fever, but 'a pure uncomplicated attack of acute bronchitis,' and that several of the cases of fever had commenced before his arrival.

^h W. B. KESTEVEN, 1865.

ⁱ HARDIE, 1867.

X See also Parkes.

there for some months at least, no one had been in any locality in which the fever existed, and no person had visited the place who was in the least degree likely to have brought infection with him. Not only is the formation of such a drain *primâ facie* likely to lead to such a result, but its existence is positively the only feasible explanation that can be found of the occurrence of the fever.' Moreover, the three persons attacked were those most exposed to the exhalations from the drain.^j

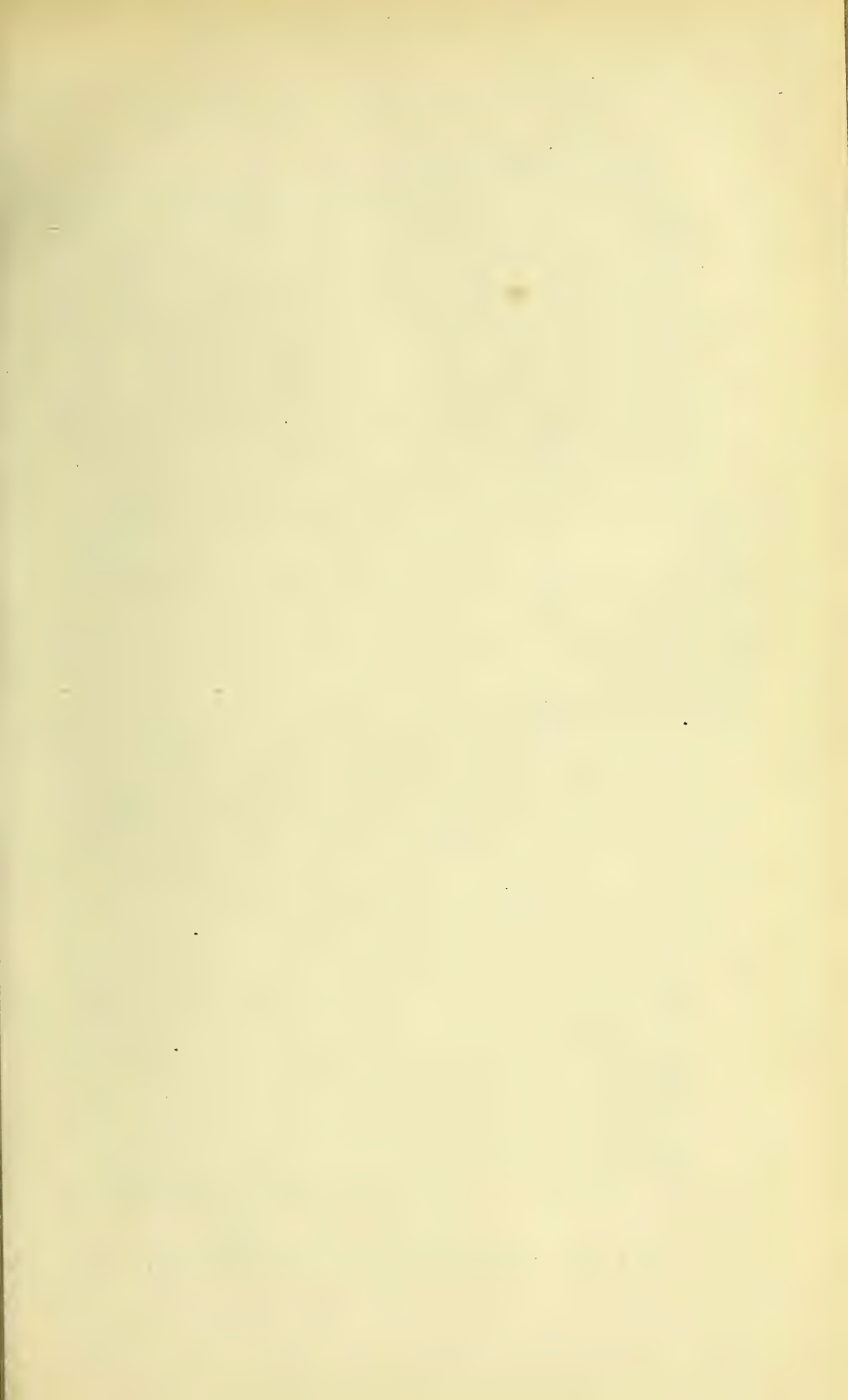
In 1868, enteric fever appeared in the 'Bishop's School' at Jutog, 2½ miles west of Simla in India. One of the masters and 16 out of 67 boys were attacked. Every effort to trace the disease to importation failed. The water-supply derived from springs in the limestone rock was good. Shortly before the outbreak a deep pit had been dug in the hill-side, 80 feet directly above the school-room building, into which the filth from the privies was deposited. The back wall of the pit was rocky, but the front and sides were soft and earthy, so that the heavy rains falling into the pit carried a fæcal solution through the soil to the school-room below. On removal of the contents of this pit, fresh cases of fever ceased to appear.^k

On the evening of May 2nd 1869, a private in the 2nd Hessian Infantry in the garrison of Homburg fell into the dung-pit of the latrine of the Military Barrack, and was covered with filth, which also entered his nose, mouth, and ears. Eight days after this he felt malaise and lost his appetite, and on the fourteenth day diarrhoea set in. Careful records were made of the pulse and temperature, which proved that the illness was enteric fever. This disease was not epidemic in Homburg at the time; no case of it had occurred in the barracks for upwards of a year, and none occurred afterwards. The cause of this isolated case was believed to be unquestionably infection with stagnant human excrement.^l

on/ In the last three months of 1869, 33 cases of enteric fever occurred in Duffaldson's Hospital, an isolated building on an elevated site in the suburbs of Edinburgh. No evidence that the disease had been imported could be discovered. The first patient was taken ill on October 25th, and all the children had been back from their holidays since September 1st. The cause of the fever was traced to certain lavatories on the same floor with the dormitories, which had not been in use for some months owing to a deficient water-supply during the summer. During the day no bad smell was appreciable in these lavatories, but in the morning 'an overpowering mephitic odour' issued from the openings in the basins and in the troughs for washing feet, which communicated directly with the drains. The water which ought to have trapped these drains was completely dried up, and the drains themselves were not ventilated. The children nearest to these lavatories were attacked most numerous and at an earlier period than the others.^m

^j T. J. MACLAGAN, 1867 (No. 2).
^k KNEVENAGEL, 1869.

^l H. CLARK, 1868.
^m GILLESPIE, 1870.



Instance of Generation of Int. Fever de novo.
Lancet. May 9th 1874. - Also
Mt. Taylor, 1872 - Stewart, 1867
Dr. Th. Egan Med. T. & G. June 7th 1873.
Confirms my views.
Lancet. July 10 - 1875. p. 62
Brit. Med. Journ. May 27. 1876.
Ed. Med. Journ March 1878.
Lancet Ap. 27. 1872. Cases of (v) from non-
typhoid sewage getting into a well.
Parker on Hygiene 6th ed. p. 49.

During the month of November 1871, 37 ladies were seized with enteric fever in a convent on the outskirts of London. Several of the patients were seen by me. I was informed by the medical attendant that there was 'no evidence whatever of the outbreak being traceable to contagion imported from without.' No one had come ill to the convent, and the patient first attacked (on November 1st) had not left the convent for six weeks. Some years before an iron grating had been put across the main drain of the convent to prevent rats coming into the house from the sewers. In consequence, an enormous accumulation of sewage gradually took place on the side of the grating nearest to the house. When the drain was opened, sixty bucketfuls were taken out. Ultimately fluid sewage would not pass the obstruction; in the autumn of 1871 the drain burst, the basement of the house was flooded, and sewage percolated through the surrounding soil. The surface-well which supplied the house with water was within four or five yards of the spot where the drain burst. Sixteen of the patients were removed during their illness to their own homes, but in no instance did they propagate the disease to others. uc

The cases which follow are of interest in connection with the mode of origin of Enteric Fever, although in none is the possibility of the introduction of the poison into the sewage from without excluded. x

Towards the end of 1838, an epidemic of enteric fever desolated the commune of Prades in the department of Ariège. Of the 750 inhabitants, 310 were attacked, and 95 died. The cause of the epidemic was traced to a stagnant pool, which was the receptacle of dead animals and of all the sewage of the district. The outbreak was preceded by damp warm weather. Three times the pestilence returned, and always when the wind was blowing over the infected water.^a

Richmond Terrace, Clifton, was a crescent composed of 34 houses. In 1847, the inhabitants of 13 of these houses drew their drinking-water from a well at one end of the crescent. The remaining houses were supplied with water from another source. At the end of September it became evident from the taste and smell of the water from the pump, that it was tainted with sewage. Early in October 'intestinal fever' broke out nearly at once in all the 13 houses in which the tainted water had been drunk; but did not make its appearance in any of the other houses. In almost every one of the 13 houses, 2 or 3 persons were laid up, and in some a much larger number. The houses in which the fever broke out were far apart in the terrace, and there was little or no intercourse between their inmates. The water from the well was the sole connecting link.^o

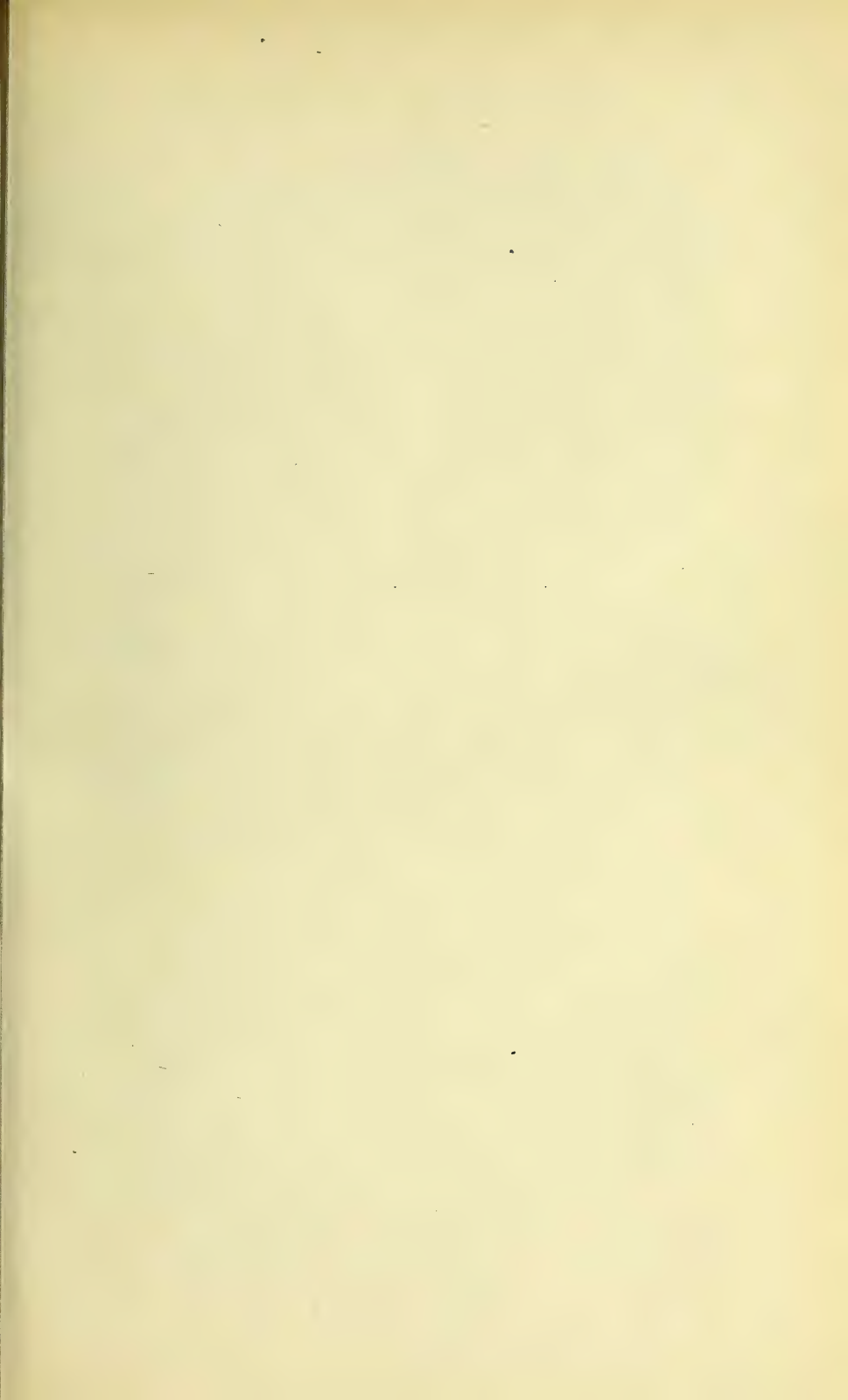
^a BRICHETAT, 1841. For other outbreaks of enteric fever in France, traced to similar causes, see *Mém. de l'Acad. de Méd.* ix. 41; xiv. 14; xv. 6.

^o W. BUDD, 1859, p. 432.

In the spring of 1857, a number of strangers came to reside at the National Hotel, Washington, to be present at the inauguration of Mr. Buchanan as President of the United States. A large number of them, including the President elect, were seized almost at the same time with enteric fever. It was reported that they had all been poisoned; at first it was said with arsenic, for some political purpose; and then by copper, from the culinary utensils. A rigorous investigation ensued; and the result was, that both the committee appointed for this purpose and all the medical attendants coincided in the belief, that the disease was due to sewer-emanations. At one part of the building there was a direct opening into the sewer, and through this a strong current of fetid air was distinctly perceptible. The fever first appeared after three very warm days, during one of which the rain fell in torrents. The sudden rise of the river Potomac, into which the sewer opened, was thought to have driven back the noxious exhalations through the gully-hole.^p

In the autumn of 1858, an epidemic of enteric fever occurred at Windsor, which was made the object of special inquiry by the medical officer of the Privy Council, and an account of which was communicated by me to the Epidemiological Society. It was calculated that, during the last four months of the year, 440 persons, or about one-twentieth of the population, were attacked, of whom 39 died. That the fever was due to the emanations from the sewers was the undisputed opinion of all who investigated the circumstances. Most of the cases, and all but one of the fatal cases, were confined to two of the three districts of the town, the low level and high level districts. Both of these districts had a complete system of drainage, with water-closets within the houses, and sinks in the basements and kitchens. The drains in these two districts were flushed, partly by a continuous flow of water through them from the Thames, and partly from artificial tanks. But, in consequence of a long-continued drought, the Thames had fallen greatly in its level, while the tanks had, from neglect, been allowed to get dry. The result was, that the sewage accumulated in the sewers, and in consequence of their ventilation being very imperfect, the sewer-exhalations escaped directly into the houses. In the two districts mentioned, the fever attacked the rich and poor indiscriminately; but the cases were most numerous and severe in the low level district, where all the drains of the town were congregated, and where they had the least inclination, that is, at the foot of Sheet Street, near the Barracks. The inhabitants in these districts complained of the offensive smells from the drains in their houses, and particularly in the houses where the fever occurred. The district of the town which remained almost exempt from the fever was the worst and poorest, where cholera had raged with greatest severity in 1849. Although the drains of this district also suffered from want of water, the water-closets were outside the houses, and there was no direct communication by sinks, or

^p See *Bibliography*, 1857.



otherwise, between the drains and the interior of the houses. With few exceptions, bad smells are not complained of in this district. One woman, however, complained bitterly of the offensive smell from the gully opposite her door; her daughter had died of fever. No case of fever occurred in Windsor Castle, which, as may be seen from the annexed wood-cut, had a drain of its own, unconnected with the town-drainage. This drain was well ventilated, and was flushed every morning by a special supply of water. A few of the houses in the

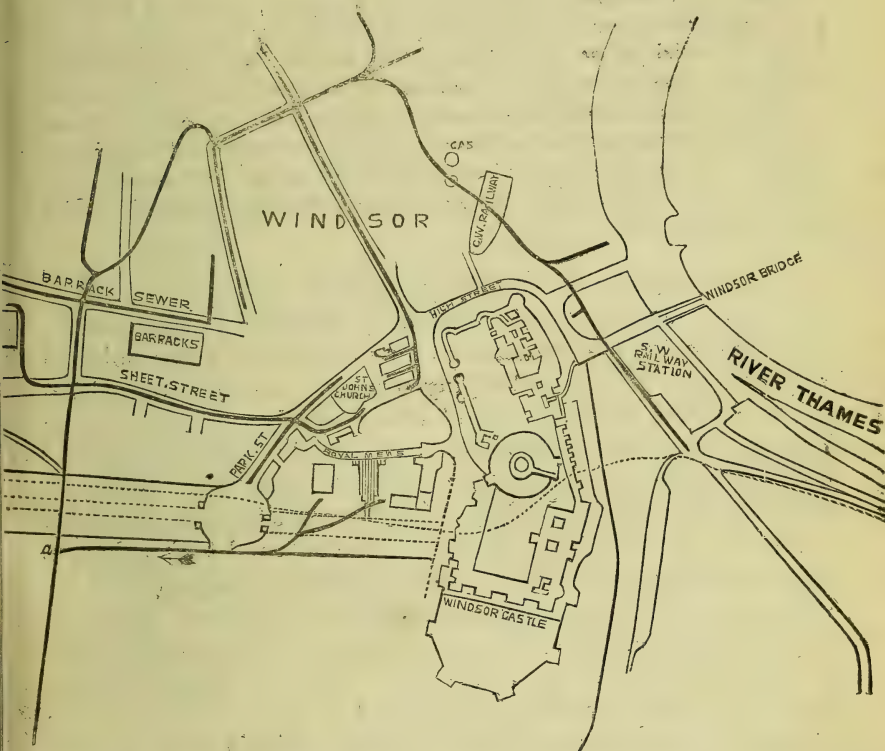


Fig. 14. Plan of the Windsor Drainage. At *a* the private drain from the Castle joins the main drain from the town.

Royal Mews, connected with the private sewer of the castle, participated in this exemption; but in the remainder of the Mews, only separated by a roadway from the more favoured portion, but connected with the town-drainage, there were thirty cases and three deaths; yet all the residents in the mews derived their drinking water from one source. Lastly, a few cases of fever occurred in the collegiate residences of the castle, which were also connected with the town-drainage.

In the latter part of 1859, Bedford was the seat of a severe outbreak of enteric fever, although before this it had been 'the autumnal habit of the town to suffer from it.' On investigation, it was found, that the

P SIMON, 1859; MURCHISON, 1859 (3).

II

distribution of the fever did not follow the ramification of the sewers; nor did it appear to depend on the escape of cesspool air into the houses: but the fever was traced to faecal matter soaking into the wells from the numerous cesspools of the town. The water from these wells was found to contain a large quantity of decaying animal matter, evidently derived from the sources alluded to.^a

At Guildford a sudden outbreak of enteric took place in the autumn of 1867, which was investigated by Dr. Buchanan. At least 500 persons were attacked. The epidemic was restricted with almost absolute precision to the high levels of the town, attacking here the poor and rich alike; but it spared entirely the low-lying parts of the town, in which alone examples of the disease had been previously observed. The only condition generally coincident with the outbreak was the high service of the town water supply; and on enquiry it was found that eleven days before the commencement of the outbreak water polluted with sewage, which had been stored up for sixteen days, had in one day been distributed by this service to the 330 houses in which the fever appeared.^r

Facts similar to the foregoing might be multiplied *ad infinitum*, but it is now almost universally admitted in this country that enteric fever is traceable to air or drinking water polluted with the products of putrefying sewage. The only opposition to the view of any moment, of late years, has come from the Edinburgh school. Sir Robert Christison, in his address to the Social Science Association in 1863, stamped with his great authority the statement that there were insurmountable facts in the way of our accepting the opinion referred to;^s although many years before he had taught his pupils to believe that there were proofs of 'the unequivocal origin of continued fever' in the putrid affluvia from decaying animal matter, while in 1846 he had himself traced an outbreak of 'a typhoid fever,' differing from the 'ordinary epidemic typhus of Scotland in the presence of gastro-intestinal symptoms,' &c., to the effluvia from the filth accumulated in an obstructed sewer. (*Vide antea* p. 473.) Professor Bennett also, in his published lectures, denies that there is any connection between decomposing sewage and the prevalence of enteric fever.^u These authorities, however, stand

^a *Third Rep. Med. Off. Privy Council.*

^r *Tenth Rep. Med. Off. Privy Council*, p. 34. For other examples, see WARD, 1838; Croydon epidemic of 1852, *Bibliog.*, 1852; Cowbridge epidemic of 1853, CAMPS, 1855; ROUTH, 1856, p. 763; MAVER, 1862; Fever at Munich, *Bibliog.* 1862; PALMER, 1865; *Reports of Med. Off. Privy Council*, *passim*; and particularly epidemic at Buglawton, vol. ix. p. 213; *Stewart*, 1867, p. 14.

^s CHRISTISON, 1863.

^t *On Poisons*, 1829, p. 476.

^u *Pract. of Med.* 4th ed. p. 942. Some of Dr. Bennett's arguments appear to me to be beside the question; others will be adverted to hereafter.

See Dr. Parker's Report on Hygiene
Jan. 1873. (referred to in Lancet. Dec. 19/74)

As to the distance to which sewage may
percolate soil Pettenkofen has published
a striking case in Wm. The ammoniated
water & gas. works was found in wells
at a distance of 700 feet.

Leber's on Cholera. Transl. I. 385.

No. 1149. *Requiem* consult *monition* on
Biology & Future Time by Dr. René Guénon
de Gué. Paris, 1876.

almost alone. The general opinion of the profession now is that put forth in my Essay on the Etiology of Continued Fevers in 1858, that enteric fever may be traced to 'the emanations from decaying organic matter, or organic impurities in drinking water.' In the admirable Reports of the Medical Officer of the Privy Council it will be found that the experiences of many years repeat again and again the general lesson that enteric fever denotes 'excremental poisoning;' while the President of the Society of Engineers has recently declared that, having examined many hundreds of houses in which enteric fever had occurred, he had in every instance been able to trace the outbreak to some unlooked-for defect in the drainage.^v

But there is not the same unanimity of opinion as to how the poison appears in the sewage. Many adopt the view taught at Munich for more than thirty years by Professor F. von Gietl,^w that the poison, although contained in sewage, is always derived from the excreta of an individual already suffering from the disease, a drain being merely the vehicle for its propagation, or, in fact, 'a direct continuation of the diseased intestine,'^x while others believe that the poison may be generated in the sewage independently of typhoid excreta. The solution of the question is undoubtedly beset with many difficulties. The former view, which has been ably advocated in this country by Dr. W. Budd,^x offers the best explanation of the circumstances in those cases where the fever is propagated by the sick; but many, if not most, of the facts adduced in its support are equally explicable on the latter view; while in others the mode of communication of the fever is not so clearly established as might be desired. It does not, to my mind, necessarily follow, that because the disease may be sometimes communicated by the sick, in every case where it is traceable to bad drainage the poison in the drain has of necessity been derived from a person previously infected with the disease. The independent production of the dysenteric poison by the putrefactions of animal substances under certain conditions has been maintained for centuries, and according to Parkes 'there is little doubt as to its correctness;^y yet the evidence of the contagious nature of the dysenteric stool^z is quite as strong, to my mind, as that of the typhoid stool. If, because a disease can be proved to be

^v Letter in *The Times*, 4th December, 1871.

^w GIETL, 1860 and 1865.

^x BUDD, 1856, 1859, 1861.

^y *On Hygiene*, 1864, p. 440.

^z See on this point the testimony of Dr. Maclean, *Art. 'Dysentery' in Reynolds's System of Medicine*, 1st ed. vol. i. p. 111.

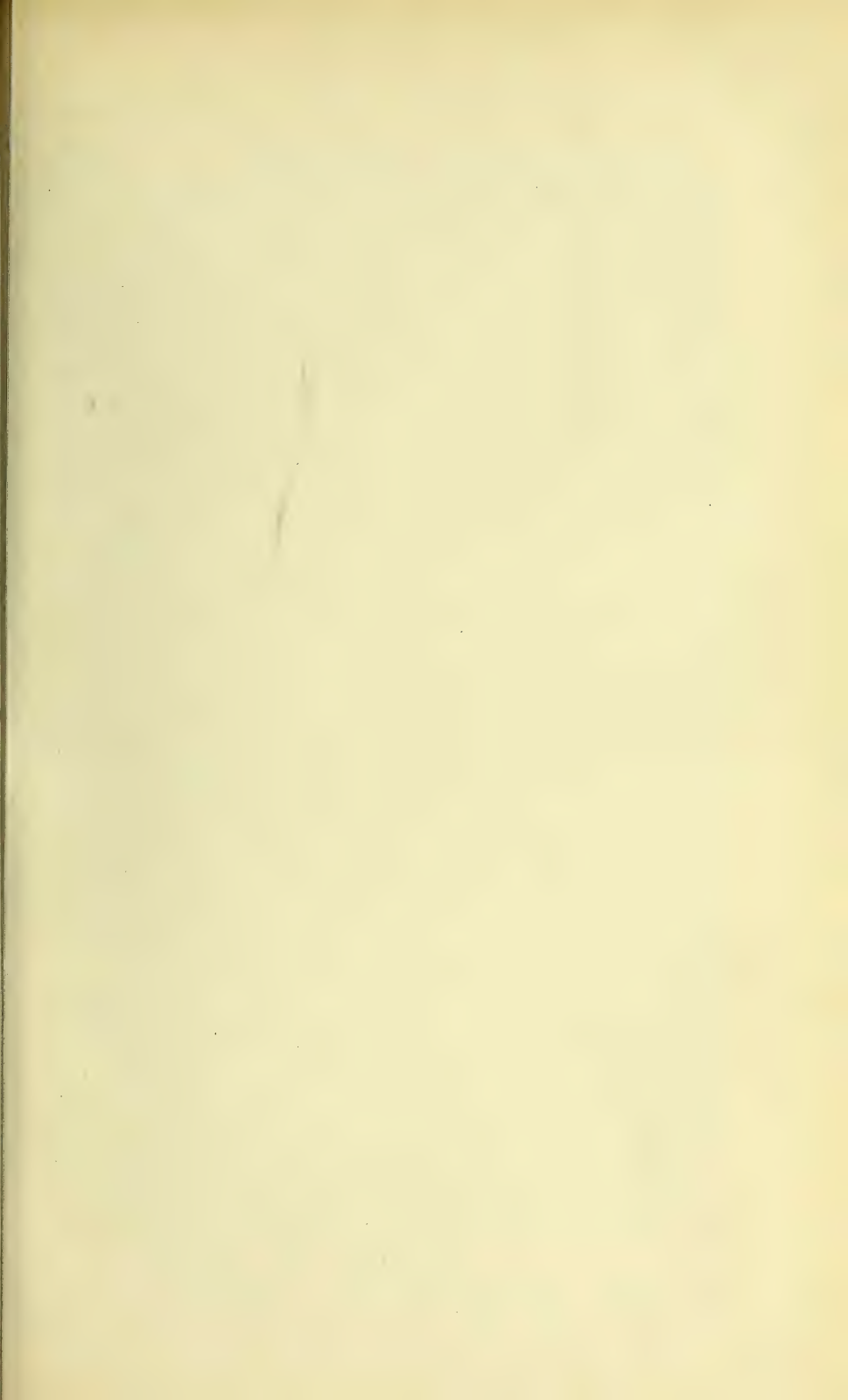
in a few instances communicated by the sick, it can never arise in any other way, there is an end to all discussion of the matter; but this does not appear to me to be a scientific decision of the question at issue.^a In the remarks which follow I shall endeavour to place the facts as fairly as possible; my readers may judge as to the soundness of the argument on which my conclusions are based.

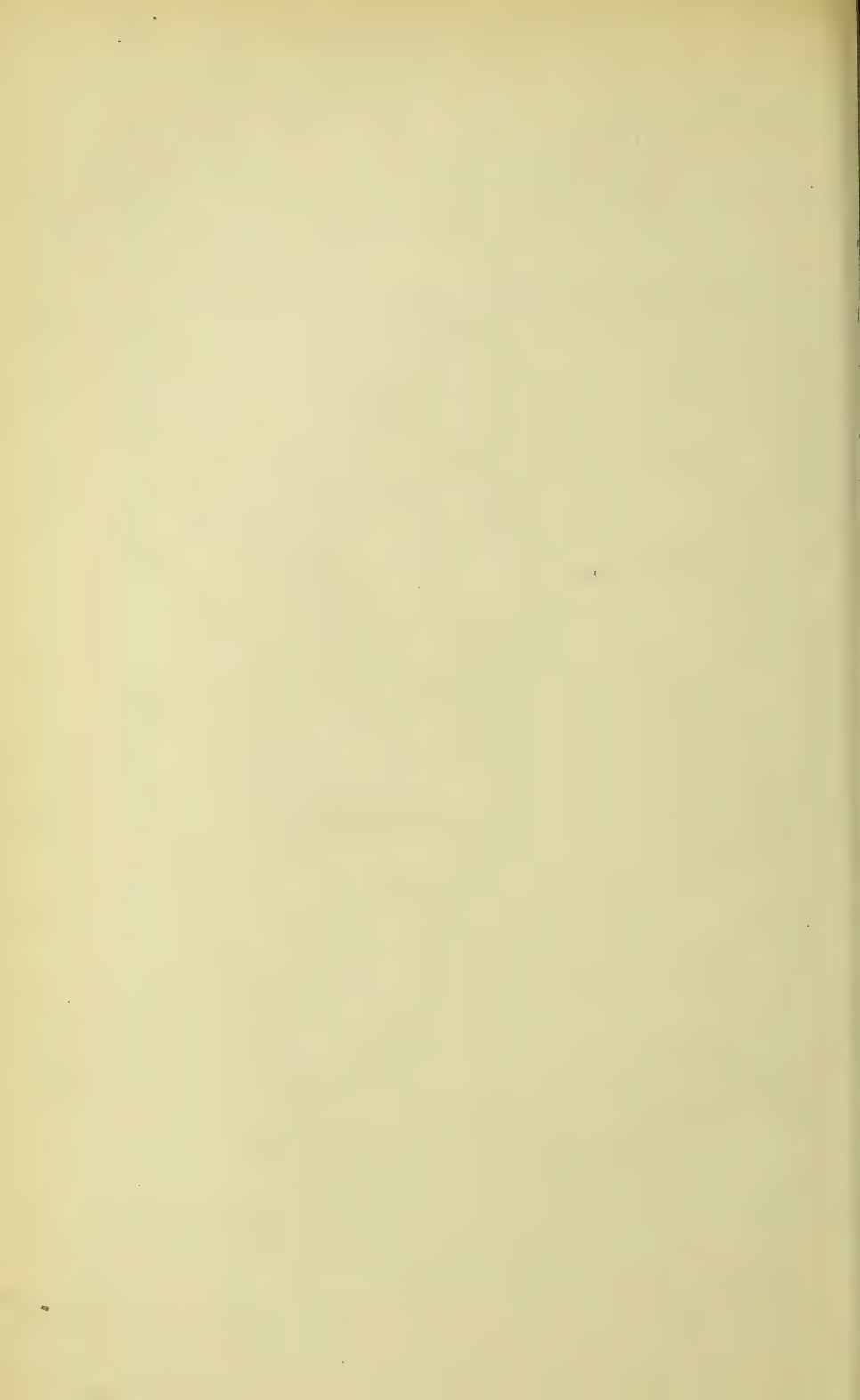
1. At the outset it must be conceded that where enteric fever is due to excremental poisoning of air or water, it is often extremely difficult, if not impossible, to exclude from the excrement the possible presence of typhoid stools. I am fully alive to the apparently crushing nature of the argument that it is 'impossible to prove a negative,' as well as to the facility of using it. It appears to me that the only scientific plan of dealing with such a question is to adopt a process of elimination. The two supposed factors are, decomposing sewage and typhoid stool. Taking cases in which there are good reasons for believing that one or other of these factors is excluded, when is enteric fever most likely to occur?

a. In the first place, it is a matter of constant observation that persons are exposed to typhoid stools in their most concentrated form, but decomposing sewage is excluded, and yet no fever results. Dr. Budd, in common with many writers, (pp. 421, 426) regards the intestinal disease as a specific eruption like that of small-pox, and he contends that an 'infinitesimally small dose' of the poison derived from this eruption is sufficient to produce the disease.^b Admitting fully the difficulty of proving a negative, there is no positive evidence that the stools of enteric fever are of so virulent a character as has been contended. Well-ascertained facts indeed prove the contrary. First, there is the remarkable exemption from enteric fever, already referred to (p. 461), enjoyed by medical men and the attendants on the sick. Secondly, there is the experience of the London Fever Hospital, of which the details have been already given (p. 463), but the main fact in which may be here repeated. During nine years 3,555 cases of enteric fever were treated in the same wards with 5,144 patients not suffering from any specific fever. Not one of the latter contracted enteric fever, although it was not an uncommon practice for them to sit over the evacuations of enteric patients, and the use of disinfectants was quite exceptional. Thirdly, private practice yields similar results. In

^a *Vide antea*, p. 8.

^b BUDD, 1859, p. 209.





the last ten years it has been my lot to be consulted in upwards of forty instances in which persons have contracted enteric fever away from home, and been brought home ill with it. Some of these cases were in London or its suburbs, and others in the country. In only two of the instances did fresh cases of fever appear in the houses into which it had been thus imported, and in neither was there crucial proof that the disease was communicated by the imported case. In the outbreak of enteric fever in a nunnery, related at p. 479, of the 37 patients 16 were removed during their illness to their own houses, but in not one of the 16 houses did the fever spread. Lastly, few can have had much experience in enteric fever without meeting many solitary cases in large families, even where little or no precaution has been taken to prevent its spread. From such evidence the conclusion appears to me to be inevitable that the *fresh* stools of enteric fever are not of that venomous character which has been claimed for them, but that, as in cholera, the poison is generated in them during their decomposition out of the body. Moreover, the stools of enteric fever are known to be remarkably prone to decomposition or fermentation. In place of being acid, as healthy fæces always are, they are alkaline; they also contain abundance of the ordinary products of the decomposition of animal matter, in the form of ammonia and ammoniaco-magnesian phosphate, while their odour fully bears out the idea of their putrid character. Such a condition must be fatal to the existence of an animal poison, such as that of small-pox. It is alleged that the morbid material deposited in the intestines contains the specific poison by which the disease is propagated, just as the contents of the variolous pustule contain the poison of small-pox. But if this be so, the poisonous matter is never passed from the body until it separates *as a slough* from the intestine, until, in fact, *it is dead and putrid*, while the contents of the variolous or vaccine pock will not produce small-pox or cow-pox, after they become putrid. It is probable that the stools of enteric fever are more prone than ordinary sewage to the specific fermentation by which the poison is produced, and that this explains why the disease is occasionally propagated by the sick. But whether this be so or not, it seems to me far more probable that the poison is *always the result of decomposition*, than that it is derived from a *specific eruption*, like that of small-pox.

b. Enteric fever is constantly appearing where decomposing sewage is present, but where every effort fails to trace the

(p. 464)

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 presence of typhoid stools. It is difficult to obtain crucial evidence on the point from what is observed in large towns furnished with a complete system of drainage, because with regard to every instance of fever arising from sewage it might be said that drains are merely the vehicle for the transmission of typhoid stools, or that they contain 'the very quintessence of a pre-existing fever.' But even in towns evidence is not wanting that enteric fever often arises from bad drainage, where it seems impossible to conceive that typhoid stools have been introduced into the drain. For example, in the case of the Peckham Police Station (see p. 474) the cesspool had no communication with the public drains; in the outbreaks at Westminster (p. 473), Clapham (pp. 472, 479), and other places, the source of the fever was traced to the decomposition of sewage in drains which were *choked up*, and so shut off from the general drainage; while in the case of the Colchester Union (p. 475) every possibility of importation appears to me to have been excluded. If drains, in their relation to enteric fever, are to be regarded as merely the vehicle for the transmission of the typhoid stools, in any epidemic it would be right to expect that the fever would be most prevalent in the houses which communicated most freely with the public drains. Yet the contrary is often observed. Take, for example, the official report to the Privy Council of an outbreak of enteric fever at Forest Hill, in 1869. 'The prevalence of enteric fever has corresponded very closely with defective sewerage arrangements. Where houses are connected with the public sewers, there the prevalence of enteric fever has been at a minimum. . . . where the houses have cesspools attached to them, or they are connected with sewers which do not form a part of any proper system of drainage, and which are of radically faulty construction and form, in fact elongated cesspools, then enteric fever has been at a maximum.' On turning to what occurs in country-districts, the evidence is still more conclusive. Many instances have come under my notice, like those of the farm-house in Peebles (p. 473) and of Balletheron (p. 477), in which enteric fever has broken out in an isolated country house, or in a small group of houses, miles away from where any fever has been prevailing, and in which every mode of importation or of communication by drains or otherwise seemed impossible.

* Several instances of this nature, in which the circumstances were most carefully investigated, were communicated to the Epidemiological Society, by Dr. Headlam





The study of enteric fever as it prevails among isolated bodies of soldiers points in the same direction. In a recent official report, Dr. J. L. Bryden, attached to the Sanitary Commission of the Government of India, remarks: 'What I have shown is, that the spontaneous origin of enteric fever is a fact. . . . The question of the spread of typhoid subsequent to its development has nothing to do with that of its spontaneous origin. . . . The doctrine that, without the introduction of typhoid excretory matter in some shape into the systems of these young men, they are safe from the development of the specific fever, does not, however, meet all the facts of the case. My observation tends to teach that, while it may be perfectly true that typhoid is in many instances so propagated, the specific lesion and its attendant fever are capable of development without the application to the system of a poison elaborated elsewhere; and that the etiology of typhoid is not comprehended within the limits to which, of late years, the tendency has been to seek to confine it.'^d

To all this it will be replied that small-pox sometimes appears when it is impossible to trace how it has been imported. But there are these differences between the two maladies. The occurrence referred to is very common in enteric fever, but very rare in small-pox; and in small-pox it is easy to demonstrate the extreme virulence of the poison, while, on the supposition that every outbreak of enteric fever is due to contagion, the poison given off by the sick ought to be much more virulent than it has yet been proved to be.

The facts observed and published by Dr. Budd in support of his views are twofold; some are adduced to show that the disease is ~~contagious~~; others, to demonstrate the intimate connection between its appearance and bad drainage. Both of these positions I readily concede, and have always contended for. But because in one set of facts the disease was communicated by the sick, the conclusion does not appear to me to be warranted that this has been the case in every instance where enteric fever is traceable to bad drainage. In the fever at North Tawton, which is Dr. Budd's chief illustration of the first position, while the facts leave little doubt that the fever was communicated in some instances by the sick to persons in health, it is not shown that the stools of

Greenhow, on April 7th, 1862. Dr. G. remarked: 'No discoverable evidence of its having originated in contagion could be traced on the most careful inquiry.'

^d Eighth Ann. Rep. of San. Com. of Gov. of India for 1871, p. 226.

Communicable

the infected were the medium of communication.^e On the other hand, Dr. Budd records three instances to show that enteric fever may be caused by 'a poison which sometimes exists in sewage,' but from two of which he subsequently argues that sewage only causes enteric fever in consequence of its having received from a diseased intestine a specific poison like that of small-pox.^f In all three instances the fever evidently arose from air or water tainted with sewage; but it is not shown that the sewage in any of the cases had become contaminated with the excreta of a person suffering from enteric fever.^g The necessary link in the evidence, viz., the introduction of the poison, is wanting. In another instance, cited by Dr. Budd, where four cases of fever occurred in a retail establishment at Bristol, it was argued that the disease in the last three cases was due to the evacuations of the first case being thrown into the common water-closet. But it was not shown that the poison was imported by the first case, which is spoken of as 'casual,' and on the supposition that the first case was due to some local cause, that cause was sufficient to account for all.^h In other instances, such as the Orphan Asylum at Ashley Hill, and the school in the South of England, where the fever appeared in connection with offensive latrines, it is also argued that the cases were due to the children frequenting the latrines into which the dejections of the first patient had been thrown, but it does not appear that the first patient contracted

^e BUDD, 1859, p. 695; 1859, p. 29.

^f 'Dr. W. Budd most strongly insists that the essence of Enteric Fever is contained in the alvine dejections of the patient, but we cannot adduce any facts recorded by himself that give material support to this view.'—Dr. J. HARLEY, *Art. 'Enteric Fever,'* in Reynolds's *Syst. of Med.* 1866, i. 623.

^g 'There are few things in the history of disease so sure as the fact that, under circumstances which are of no uncommon occurrence, the excreta which the sewer receives from the human intestine may become the cause of intestinal fever. The proof on which the inference rests is so clear and precise as to leave no room to the severest scepticism to interpose a single doubt.'

^h 'The Abbotsham Place and Richmond Terrace outbreaks further show that these excreta produce this effect, not by a vague or general mode of action—as cold and damp, for instance, may give pleurisy, bronchitis, or rheumatism, as the case may be—but by actually furnishing the specific poison which is the physical cause of the fever, as much as the marsh miasm furnishes the poison which gives the ague, or—to take a still stronger illustration—as much as, in the old practice of inoculation, the lancet furnished the specific poison which gave the small-pox.'—*The Lancet*, 5th November, 1859, p. 458.

^e W. BUDD, 1859, pp. 432, 458; 1861, p. 550. In one of the instances, it is stated, that a few days before the water of a certain well was discovered to be contaminated with sewage, there was a single case of fever in an adjoining house. But it is not shown that this patient contracted the disease elsewhere than in the house in question, or that diarrhoea had occurred before the patients in the next house began to be ill. It appears to me, that Dr. Budd has omitted to place the key-stone in the arch of his argument.

^f BUDD, 1856, p. 618; 1859, p. 458.



the disease elsewhere than in the asylum or school.¹ Even in the account of the North Tawton outbreak, although the date and locality of the first case are mentioned, it is not stated that the patient caught the disease away from the place. The circumstance much dwelt on by Dr. Budd, that extensive outbreaks of enteric fever have occasionally been preceded by two or three isolated cases, proves nothing in favour of contagion, in my opinion, except it can be shown that in these first cases the fever was contracted away from the site of the subsequent outbreak.²

2. It is a common argument that excremental pollution of air and drinking water may exist for years without causing enteric fever, which only appears after the arrival in the locality of an infected person. The first part of the statement is true, but admits of another explanation than that usually assigned to it. Excremental pollution may be only one of several factors necessary for the production of the poison, and in the absence of the other factors it may be inert. In point of fact we know that a certain temperature (and perhaps other atmospheric conditions) conduces to the prevalence of enteric fever, and it is very possibly essential to the production of the poison. It is generally admitted that autumnal diarrhoea may result from drinking sewage-polluted water; but the same polluted water may be drunk for a long time with impunity, so long as it has not been subjected to certain atmospheric conditions common in autumn. It is quite true, then, that excremental poisoning may exist for a long time without any fever, but it does not follow that when a sudden outburst of the disease at last takes place, this has always been preceded by the arrival of an infected person. Sometimes the poison may have been imported, but in a large proportion of instances no such importation can be traced; and when the disease is imported it does not spread, unless there be at the same time defects in drainage or in the water-supply. In some instances a person newly-arrived is the first to suffer in virtue of a well-known law of the disease (see p. 456); while other outbreaks commence by a large number of persons being attacked.

¹ BUDD, 1856; 1859.

² An instance of this sort occurred at the Clergy Orphan School at St. John's Wood in 1856. Dr. Aitken in quoting this case in his influential work, *Science and Pract. of Med.* 2nd ed. i. 408, remarks: 'The first case was imported, and the illness began ten days after arrival.' But on turning to the reference given by Dr. Aitken (*Lancet*, 15th November, 1856) it will be found: 1. That the first patient was taken ill twelve days after the school reassembled; 2. that there is no mention of the first case having been imported; and 3. that the reporter speaks of 'some local cause' being at work.

simultaneously, without any isolated cases preceding. Many of the instances adduced in support of the argument now referred to have broken down on investigation. One example, which attracted much notice,^k will suffice. In June 1872 enteric fever was said to have been imported into the village of Nunney, in Somersetshire, by a man who came there ill from Old Ford, five miles distant. For twenty-eight years there had only been an occasional case of enteric fever at Nunney, although all that time the inhabitants had drunk of a stream polluted with sewage, the disease only becoming epidemic when what was believed to be a specific ferment entered the stream. It is obvious, however, that there must have been circumstances favourable to the spread of enteric fever at Nunney in June 1872, which had not existed when isolated cases had occurred there in 1867, 1870, and February, 1872; and when it is added that no other case of enteric fever was observed at Old Ford in the summer of 1872, besides that of the man who was believed to have imported it into Nunney, that this man had visited Nunney three weeks and one week before his illness, and that on the former occasion he had attended a meeting of his club in the house where the worst and greatest number of cases of enteric fever subsequently occurred,^l it follows that the origin of the epidemic admits of a very different interpretation from that which was first apparent, and that it is not, as was imagined, a crucial proof of the necessity of a specific faecal ferment for the production of enteric fever.

3. In opposition to the view that the poison of enteric fever can be produced *de novo* in decomposing sewage, it has been urged that the workers in drains and nightmen are particularly exempt from fever. The facts appealed to in support of this statement have been there recorded by Parent du Chatelet^m and Dr. Guy,ⁿ but on close examination they scarcely justify the inference drawn from them. In an appendix to Du Chatelet's Essay on the Diseases of the Workmen in the Drains of Paris, it is stated that, during six months, 4 of the 32 workmen who formed the subject of the essay were in hospital for two or three weeks with a '*fièvre bilieuse*,' or a '*fièvre bilieuse et cérébrale*.' Although these cases are not dwelt on in the body of the essay and have been generally overlooked, it is

^k Dr. Ballard's *Official Report*; *Med. Times and Gaz.* 1873, i. 18; *Lancet*, 1873, i. 107.

^l *Med. Record*, 19th March, 1873.

^m PARENT DU CHATELET, 1829.

ⁿ GUY, 1848.



impossible to regard them in any other light than as examples of enteric fever. Again, the result obtained by Dr. Guy was simply this: that whereas of 101 labourers and brickmakers 32 had suffered from fever; of 96 nightmen, scavengers, and dustmen, only 8 had suffered. Dr. Guy's observations, however, were made without any reference to the form of fever in either case, and, indeed, at a time when the distinctions between the different continued fevers were little known; and there is evidence that the excess of fever among the bricklayers' labourers was *typhus*, inasmuch as it was attributed to the men being Irish, and to their habits of overcrowding. Dr. Guy distinctly states that some cases of fever were generated by the effluvia from drains and cesspools. Moreover, scavengers and dustmen are not particularly exposed to such effluvia. According to Dr. Peacock's experience, enteric fever is not uncommon among the workers in sewers;^o and several instances have occurred to me, where workers in *obstructed* drains have contracted the disease (see also p. 456). The disease would, perhaps, be more common in this class of labourers, were it not that most of them are above the age most liable to enteric fever, that some may be protected by previous attacks, and still more, that lengthened exposure to the exciting cause diminishes the risk of infection. Whatever be the cause of enteric fever, it is generally admitted that constant exposure fortifies the system against its action (see p. 456). In the outbreak at Clapham, already alluded to, although 20 out of the 22 boys suffered from the opening of a drain, the workmen who went down into the drain escaped. Hence, on the supposition that sewer-emanations can produce enteric fever, it is not so surprising as it might at first seem, that persons most exposed to them suffer less than others whose exposure is casual. It seems, however, to have been forgotten in the discussion, that on the supposition that the stools of one typhoid patient may give the disease to thousands, and that a drain is but the 'continuation of a typhoid intestine,' the exemption from enteric fever of the workers in drains is equally extraordinary. It is still more extraordinary when we find that the labourers who chiefly contract enteric fever are those employed in drains *obstructed* by fermenting sewage, where we might naturally suppose that the continuation with the typhoid intestine was interrupted.

^o PEACOCK, 1856 (1).

4. On the supposition that the poison of enteric fever can be developed from decomposing animal matter, it would be natural to expect that certain conditions would be necessary for its production. In the first place, the poison is not contained in the exhalations from every sort of decomposing animal matter, such as dead human bodies during exhumations or in a dissecting room, putrid meat,^p old bones, putrid blood employed for refining sugar,^q the horse-slaying yards of Mont-faugon,^r or any heap of rubbish, or uncovered dunghill. Secondly, although bad smells often denote the presence of typhoid poison, the latter does not exist in every bad smell, and like the miasma of ague is probably inappreciable by the senses. It is no argument then against the production of enteric fever in the manner now advocated, that it has not been produced by the odours of flowers, or the intolerable smells of the mangrove-swamps of Africa.^s Thirdly, it is probably necessary for the production of the poison that the fermenting matter be in a confined space, as in a drain or well, and in a state of stagnation. Free exposure to the atmosphere, or constant dilution in a running stream, may not only render the poison inoperative, but prevent its formation. On this view, it is not surprising that enteric fever did not prevail in the filthy closes of Edinburgh before the introduction of drainage, that it is not endemic around the meadows of Craightinny which receive the drainage of Edinburgh, and that no extensive outbreak of it occurred in London in 1858, in connection with the unusually filthy and offensive condition of the Thames.^t The many writers who have appealed to the fact last mentioned to prove that decomposing sewage cannot produce enteric fever seem to have forgotten that it cuts both ways. The Thames receives annually the excreta of thousands of typhoid patients, those of one patient being sufficient, it is said, to give the disease to a whole community, yet we do not

^p Gastro-enteritis, but not enteric fever, is excited by eating tainted meat, fish, cheese, and sausages in certain forms of decay. Griesinger, however, seems to think that animal food in a state of decomposition may excite enteric fever (GRIESINGER, 1864, p. 157).

^q GHISHOLM, 1810; BANCROFT, 1811, p. 634; R. WILLIAMS, 1836.

^r DU CHATELET, 1832.

^s Such arguments have been adduced by Professor Bennett (*Pract. of Med.* 4th ed. p. 942).

^t The oft-repeated argument, that during 1858 the prevalence of fever in London was much below the average requires a word of explanation. The fact was owing to the almost total disappearance of typhus (see page 52), which in the two former years had been so prevalent. There was no decrease of enteric fever, as I ascertained by numerous enquiries at the time, and as is shown by the returns of the Fever Hospital (see p. 442).

find enteric fever constantly raging on its banks. Fourthly, in most of the instances where enteric fever has been traced to faecal effluvia conveyed through the atmosphere, these effluvia have escaped into the interior of houses. A stinking privy outside a house is not so dangerous as a badly appointed water-closet within (see p. 444). Lastly, certain conditions of atmosphere are probably essential to the production of the poison, such as a certain degree of heat, or a deficiency of ozone, &c.

5. It has been argued that many cases of fever are independent of organic impurities; but this objection has mainly arisen from all forms of continued fever being regarded as one disease. Thirty years ago, a memorable discussion took place between the late Dr. Alison, of Edinburgh,^u and the London Poor-Law Commissioners.^v The London observers showed that fever often arose from putrid emanations, and was independent of destitution; whereas Dr. Alison brought forward evidence that destitution was the chief cause of its propagation, and that putrid emanations had nothing to do with it. Both were right, but their observations were made on different diseases.

At the same time, it must be admitted that we cannot succeed in tracing every case of enteric fever to organic impurities. But if the disease can be traced to such causes in a few undoubted instances, it is reasonable to infer that the causes are similar in all cases where it has an independent origin. As already stated, the actual poison may, like the miasma which gives rise to ague, be inappreciable by the senses, or by chemical research. During the last fifteen years, however, I have met with few examples of enteric fever, which, on investigation, could not be traced to defective drainage, the existence of which was often unknown to the inhabitants of the infected locality.

6. In the discussions which have taken place on the origin of enteric fever, the success of the measures for rooting out the disease have been frequently appealed to in disproof of the 'pythogenic theory.' It has been contended that the disease may be stamped out by recognizing the fact that, when enteric fever is traceable to bad drainage, the disease is due to germs derived from a diseased intestine, and by destroying these germs with chemical reagents, such as chloride of zinc and

^u ALISON, 1840 (No. 2); also PERRY, 1844, p. 84.

^v ARNOTT, 1840; *Report of Poor Law Com., Bib.*, 1842.

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carbolic acid. But the success of the measures referred to is as much in favour of the pythogenic theory as of that which is opposed to it. In prophylaxis, the upholders of the former theory differ from the holders of the latter simply in this, that they are not satisfied with destroying the excreta of the sick, but insist on the necessity of preventing the pollution with sewage of any sort of the air in houses or of drinking water.

7. In connection with this discussion it is not immaterial to observe, that there is an analogy on many points between enteric fever and diseases acknowledged to be malarious: *a.* The prevalence of both varies with season, temperature, &c. *b.* Recent residence predisposes to both. *c.* Both only prevail under certain known infractions of sanitary laws. *d.* The quality of the poison varies with the locality. The varieties of small-pox and scarlatina can be proved to be due not to any difference in the quantity or the quality of the poison, but to the varying constitutions of the recipients. On the other hand, the varieties of malarious remittent fever are due in great measure to the dose of the poison, or the locality where this has been generated, and the same remark applies to enteric fever.

TABLE XLVI.^w

Months	Diarrhoea		Fever		
	Cases of Diarrhoea reported to General Board of Health	Deaths from Diarrhoea reported by Registrar-General	Total cases Continued Fever reported to General Board of Health	Cases of Enteric Fever only admitted into London Fever Hospital	Cases of Typhus admitted into London Fever Hospital
May	633	47	548	1	42
June	1,770	114	704	9	18
July	13,506*	609*	874*	19	35
August . . .	19,557	915	839	26	16
September .	8,432	519	891	34	14
October . . .	2,846*	232*	1,179*	38	10
November . .	1,118	85	919	33	1
December . .	767	73*	664	29	2
Total . . .	48,629	2,594	6,618	189	138

^w The numbers marked * in the first three columns, represent the cases which occurred during five weeks, the others only those for four. This arises from the data being derived from *weekly* returns. The last two columns show the numbers admitted from the first day of one month to the first of the subsequent one. The third column, of course, includes typhus cases; but the fifth shows that this fever was greatly on the decline at the period of greatest prevalence, indicated in the third and fourth columns. The fourth column contains *only* cases of enteric fever.

See Dr. J. M. Woodell in B. No. J. March 25/76
and some Vol. at several other places.

In Glasgow Med. J. July - 1876, p. 416 Dr. Duncan
refers to exp^t of a German Physician Birch -
Hirschfeld, who fed rabbits on stools of Typhoid
patients for tests of Typhoid ulcers. The rabbits exhibited
hyperemia & swelling of the follicles of ileo. caecal
valve & vermiform appendix, & in some cases
ulceration of bowels. When the rabbits were fed
on non-typhoid putrid infusions, the result
was simple diarrhoea, with irritation of bowels.

Hirschmanister said to have obtained like
results.

That these exp^ts were repeated by Dr. Babcock
in a number of instances, & always with entirely
negative results, so far as giving rabbits any
thing like Typhoid Fever. - See Arch. d. Heilk
XVII Jahrg. 2 & 3 Heft - abstract in Proc.
Gustafsholm. Bd. 132. 1876

Also Klein's Rep. to Med Off of Army Council
Sgd. See Y. B. 1873-4 p. 75.

See also Brit. Med. Journ. March 25. 1876
p. 323

I have often been struck with the similarity in the symptoms of all the cases of enteric fever occurring in the same house. Thus, I have known all the cases in one house very mild, and in another, very severe; urgent diarrhœa or sickness in one house, no diarrhœa or sickness in another; severe cerebral symptoms in one house, no cerebral symptoms in another. In one instance I have met with three cases of relapse, and in ~~another~~ ^{two instances} with two cases of perforation, in the same family.

It is also interesting to note that the ordinary autumnal increase, or circumscribed epidemics, of enteric fever are usually preceded by a great prevalence of diarrhœa, the diarrhœa reaching its acme long before the fever does, and having greatly declined by the time that the latter is most prevalent. This observation has been made in many epidemics of enteric fever, and is illustrated by what occurred in London in 1857, as shown in Table XLVI.

8. Lastly, experiments on the lower animals do not as yet warrant any conclusions as to the etiology of enteric fever.

Many years ago, Messrs. Gaspard, Magendie,^{*} Leuret, and Hammond[†] showed that by injecting putrid substances into the veins of animals symptoms very similar to those of enteric fever might be induced, and that after death the intestines were much congested. The same results were obtained by D'Arcet,[‡] from injecting into the veins putrid pus. Magendie also made experiments on the effects of inhaling the gases emitted by putrefying animal matter. Into the bottom of a cask he introduced putrid substances, and in the upper part he placed an animal, supported on a second grated bottom, so as to expose it freely to the emanations from below. In one dog, which died on the tenth day, the intestines were found much inflamed. Although none of these experimenters succeeded in producing the specific lesions of enteric fever, the putrid substances which they employed differed from that which probably produces the poison of this disease, which appears to result chiefly from faecal fermentation. In 1858, Dr. Barker of Bedford published the results of some interesting experiments, which consisted in making animals inhale cesspool effluvia.[§] The animals were placed in a closed chamber, through which a constant current of cesspool air was kept up. In most of the animals, vomiting and purging were produced,

^{*} MAGENDIE, 1823.

[‡] D'ARCEY, 1842

[†] LEURET and HAMMOND, 1827.

[§] BARKER, 1858.

and in one where the experiment was prolonged, the symptoms were not unlike those of enteric fever; but no mention is made of the *post-mortem* appearances in any case. Dr. Richardson, however, states that he succeeded in producing 'patches of ulceration along the alimentary tract' of a dog, by making it inhale sulphide of ammonium, one of the gases given off by cesspools.^b On the other hand, some years ago I fed a pig for six weeks on the fresh stools of patients suffering from enteric fever. They were mixed with barley-meal, and given two or three times a day. The animal appeared to suffer no inconvenience, but on the contrary got very fat, and when killed had perfectly healthy intestines.^c But there is no clear proof that any of the lower animals are liable to enteric fever.^d The statement that the 'cattle plague' is pathologically analogous to human enteric fever has been proved to be devoid of foundation;^e and the same must be said of the so-called 'typhoid or intestinal fever of the pig.'^f

Before concluding this argument, it may be satisfactory to the reader, as it certainly is to the author, to add that the view which he has advocated for fifteen years as to the possibility of enteric fever having an independent origin, has been endorsed by such authorities on fever as Griesinger,^g Niemeyer,^h Liebermeister,ⁱ Hudson,^j and Stewart.^k 'Upon no subject in practical medicine,' says Hudson, 'is there a larger or more constantly increasing mass of evidence, than as to the power of faecal miasm to generate typhoid fever, and to the fact that it does so.'

The etiology of enteric fever may be thus summed up:—

1. Enteric fever is either an endemic disease, or its epidemics are circumscribed.
2. It is most prevalent in autumn and after hot weather.
3. It is independent of overcrowding, and attacks the rich and poor indiscriminately.
4. It may be generated independently of a previous case by fermentation of faecal and perhaps other forms of organic matter.

^b RICHARDSON, 1858, p. 345.

^c For the details of the experiment, see MURCHISON, 1858 (4).

^d Falke has published the particulars of an epidemic among horses, which was believed to be enteric fever, and to be excited by human typhoid stools. *Schmidt's Jahrb.* 1865, vol. 127.

^e See my Report in the Blue Book of the Cattle Plague Commissioners, and also *Path. Trans.* vol. xvii. p. 441.

^f See my description of this disease in the *Fig. Path. Trans.* vol. xviii. p. 295.

^g GRIESINGER, 1864, p. 156.

^h *Text Book of Pract. Med.* Amer. Transl. ii. 573.

ⁱ *Deutsch. Arch.* 1869, vii. 156.

^j HUDSON, 1867, pp. 39, 317, 325.

K. Stewart, 1867, p. 14. + Lee

also H. Taylor, 1872

Ref. to American Phys. Essay in Cause of
O. Lancet. Oct. 5/78.

See letter by Professor Tyndall in "Times" of
Nov. 9 - 1874. and replies, Nov. 10.

R. Virchow. Causes of Typhoid. Deutsch. Med. Woch.
1876. Nos. 1 & 2. also in Med. J. & G. 1876. III. 386.

See important statement by Sir W. Jenner, B. Med.
Feb. 20/75. Clin. Trans. Vol. VIII p. 39.

According to Bruce Jones the typhoid poison
may be formed out of albuminous substances
"in cavers, in drains, in ditches, horse-dung
in the drains of the human body".

See in Path. & Therap. 1867. p. 221.

D. Rawles of Munich strongly upholds open
causes origin. - See Pathes. Ann. Med. Ref.
for 1872 - 1874. Important discussion at
Munich.

See also Discussion before Glasgow Med. Soc. Soc.
in which de causis views admitted by most of
speakers. Glasgow. Med. Journ. July. 1876 - p. 415.

= Klein's Typhoid Germus shown to be a fallacy

Brit. Med. J. Oct. 14/76. & Proc. Roy. Soc. Dec 172.

also Supra (Report to San. Comm. West. Ser. III p. 2)

Important Discussion in French Acad. of

Med. Bull. 1876-7. Discovery of Typhoid
Germus in Germany
Lancet. Jan 25/79

5. It may be communicated by the sick to persons in health, but even then the poison is not, like that of small-pox, given off from the body in a virulent form, but is developed by the decomposition of the excreta after their discharge.

6. Consequently, an outbreak of enteric fever implies poisoning of air, drinking water, or other ingesta with decomposing excrement.

SECTION VI. SYMPTOMS OF ENTERIC FEVER.

A. CLINICAL DESCRIPTION.

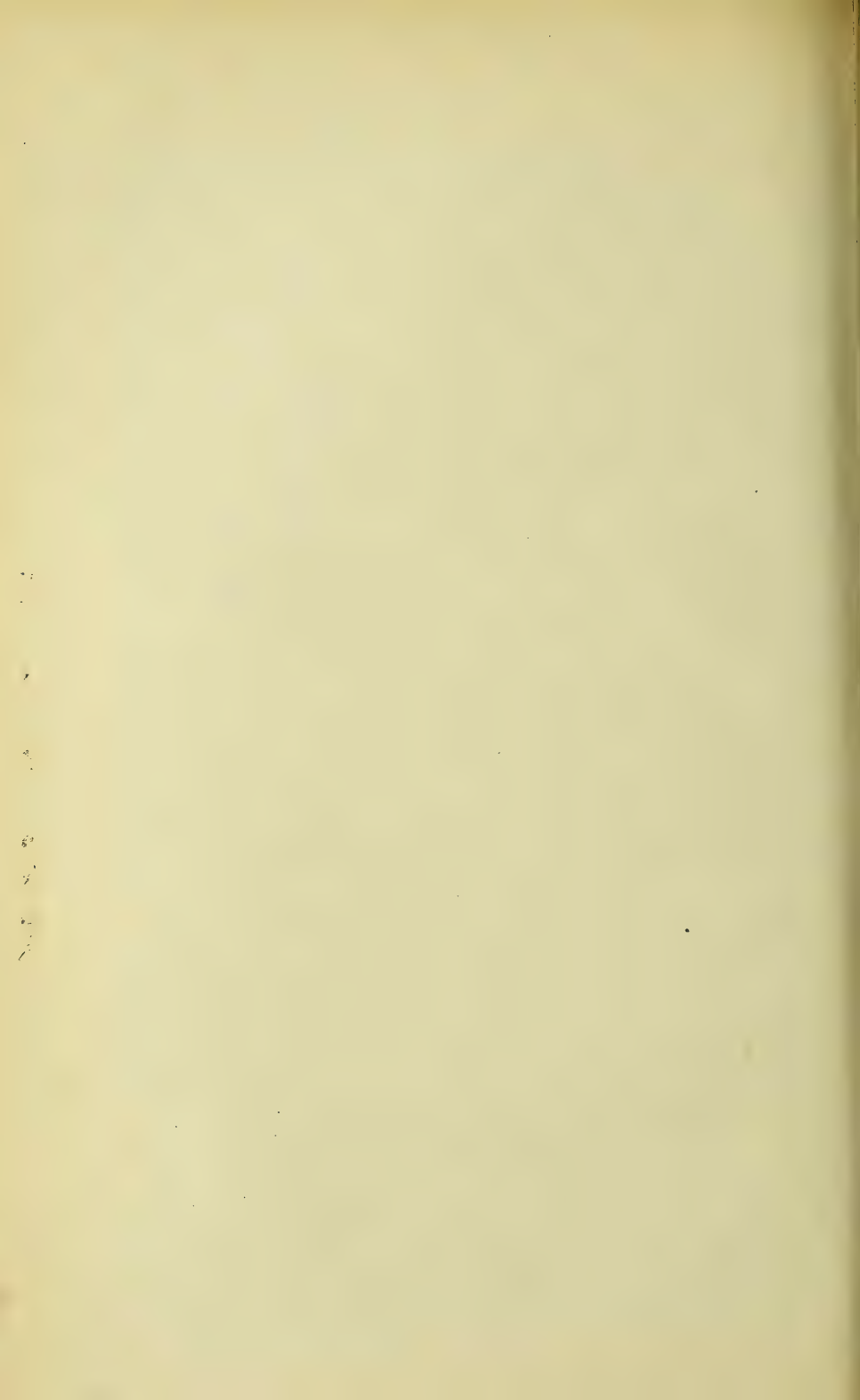
The advent of enteric fever is in most cases gradual. The patient is often unable to state the precise day on which his illness commenced, although his mind may be clear and his memory good. In some cases, the first symptoms complained of are irregular chills, loss of appetite, headache, pains in the limbs, giddiness, and ringing noises in the ears, with, or without, diarrhœa and sickness. In many cases, relaxation of the bowels, with or without sickness and abdominal pain, is the first symptom which attracts attention, and the patient is thought to be suffering from an attack of ordinary diarrhœa or of gastric derangement. Occasionally, urgent diarrhœa supervenes on the administration of a purgative. In addition to these symptoms, the pulse is accelerated; the skin is hot; the tongue is furred, and red at the margin; and there may be slight epistaxis. At the same time, the patient has disturbed and restless nights, and he feels weak and disinclined for bodily or mental exertion. Still, he is rarely so prostrate as to keep his bed during the first five or six days of the disease; and it is not uncommon for patients to continue at their ordinary employment, for the first week or ten days, or even to walk to hospital at the end of a fortnight. The above symptoms manifest themselves in varying degrees of severity during the first week. The fever is remittent in its type, the exacerbations occurring in the afternoon or evening, and the remissions in the morning. As yet, there is nothing absolutely pathognomonic of enteric fever; but the concurrence of diarrhœa or gastric disturbance with an evening temperature of 103° or 104° F. and prostration, in a young person, ought always to make the practitioner suspect that this is the disease which he has to combat.

At the end of the first week, before which the patient seldom comes under the observation of the physician, the symptoms are

as follows:—The pulse is between 100 and 120, but its frequency varies in the same patient; at one time, it may be 90 or 100, and at another 120; as a rule, it becomes accelerated towards evening and in the night, and falls in the morning; although weaker than natural, it may still exhibit some resistance. The skin is dry; but frequently, and particularly in the morning, it is clammy or moist; the temperature is two or three degrees lower in the morning than at night. The lips are parched and dry. The tongue is covered with a thin white fur; its margin and tip are red. The patient has no appetite, but complains of thirst, and has occasionally bilious vomiting. In most cases, the bowels are relaxed; there are two, four, six or more watery motions, of an ochrey-yellow colour, in the twenty-four hours. When there is no diarrhoea at this time, it may be found to have existed before the patient applied for advice. The abdomen is often distended and tympanitic, and there is sometimes gurgling, on pressure, in the right iliac region. The spleen is enlarged. The urine is scanty, dense, and high-coloured. The headache, giddiness, and disturbed sleep continue; but the mind is usually clear, and the memory unimpaired; there is rarely any delirium even at night. The patient does not exhibit that heavy, stupid expression, so characteristic of typhus; the conjunctivæ are not injected, and there is no general dusky flush of the face; but, on one or both cheeks, there is often a circumscribed pink flush, not unlike the hectic flush of phthisis, which varies in intensity at different times, but is usually most developed towards evening and after food.

On the seventh day, or some time between this and the twelfth day, an eruption appears on the chest, abdomen, and back, which consists of isolated, small, circular, well-defined, rose-coloured spots, slightly elevated above the skin, and disappearing on pressure, but returning when the pressure is removed. Their number varies from three or four to many hundreds, but in most cases does not exceed twenty or thirty at one time. They are developed in successive crops. (See Plates III. IV. and V., and page 509).

About the middle of the second week, the headache and general pains abate; and by the end of the week, they are rarely complained of. At this time, in mild cases, the morning remissions become more decided and all the symptoms may abate; but in severe cases the temperature still keeps up, and the remissions are less marked. In severe cases also, about



the time that the headache ceases, more or less somnolence supervenes, which is often interrupted by delirium. At first the delirium is slight, and only observed during the night; but gradually it becomes more severe and constant. It varies greatly in its intensity and character in different cases: but, as a rule, it is more acute and noisy than in typhus. In the intervals of delirium, the patient may be perfectly rational and conscious; at other times, he is more or less confused: or occasionally, he lies motionless in bed, with his eye-lids closed, but takes notice and appears to understand perfectly what is said to him; he puts out his tongue, and does what he is told at once; his countenance is depressed and languid; and when spoken to, his answers, although prompt, are inarticulate and unintelligible. At the same time, the pulse is 120, or upwards, and weak; the remissions of the fever are less marked; the pupils are dilated; epistaxis may occur; the lips are parched and cracked; sordes collect on the teeth; the tongue is dry and brown at the base and along the centre, or it is red, glazed, and marked by deep fissures; the abdomen is more distended; the bowels are still relaxed, and the stools contain membranous flakes and occasionally blood. The urine is paler and less dense. Fresh spots continue to appear; but the old ones fade, and are never converted into petechiæ. Bed-sores form over the sacrum and other parts of the body subjected to pressure.

Day by day, the patient loses flesh and strength, and becomes more unconscious, and all the phenomena of the typhoid stage of typhus,^k viz: dry brown tongue, feeble pulse, low muttering delirium, stupor, tremors, subsultus and involuntary evacuations may be developed. In this state, death may take place by coma; or gradual improvement may occur towards the end of the third, or in the fourth week of the disease.

But, in a large proportion of cases, the typhoid stage is never developed; while in many there is little or no delirium, and the mind is clear throughout the attack. Even in cases of this nature, however, the patient is not exempt from danger. Apart from pulmonary and other complications, which may supervene at any period and prove fatal, there are certain risks arising from the intestinal lesions, with which the fever is invariably accompanied. Death may occur at any time during the third and fourth week from peritonitis consequent on perforation of the intestine, from profuse and exhausting diar-

^k See page 181.

rhœa, or from hæmorrhage from the bowels; and then the consciousness may remain unimpaired until the last.

When the disease terminates favourably, the amendment is, in most cases, gradual. It is rarely possible to determine, as in typhus and relapsing fever, the precise day on which convalescence commences. The first sign of improvement is a more decided remission of the pyrexia. The usual duration of the disease is from three to four weeks. Convalescence is at all times tedious, and is apt to be interrupted by various complications. Occasionally, after it has advanced for ten days or a fortnight, there is a relapse of the original fever, lasting for ten or twelve days, and characterized by a fresh eruption of lenticular rose spots, and by fresh deposit in the intestinal and mesenteric glands. It follows, that an attack of enteric fever is sometimes a disease of two or three months' duration.

Such is the clinical history of ordinary cases of enteric fever. But the picture is susceptible of numerous modifications. There is no disease, in fact, which exhibits a more protean character, from the predominance of certain symptoms, and from the presence of complications. Some cases run a very mild course, so that the patient is scarcely confined to bed; some are at first severe, and afterwards put on a mild character; others, at first mild, undergo a sudden aggravation; while others are severe from first to last. Occasionally, acute delirium is observed almost from the commencement; while, in many cases, there are no cerebral symptoms throughout the ^{attack} ~~disease~~. Vomiting may be a distressing symptom, and diarrhœa may be profuse and constant; or, on the other hand, there may be no symptoms of gastric derangement, and the bowels may be constipated from the beginning to the end.

B. ILLUSTRATIVE CASES.

CASE XLIII. *Enteric Fever of moderate severity. Convalescence at end of Fourth Week.*

Emma B—, aged 16, servant, adm. into London Fever Hospital Oct. 17, 1858. She stated that her master and mistress and their son had all died of same fever, and that the smell from the closets and sinks of the house were frightful. She had been ill for ten days, but had only kept bed for two days. Principal symptoms had been headache, diarrhœa, loss of appetite, and thirst.

Oct. 18 (12th day). Pulse 96. Expression languid, but not at all stupid. Headache ceased, but had a restless night. Intelligence is now clear, or but very slightly confused. Pupils dilated. Skin hot

and dry. Two lenticular rose spots on abdomen. Tongue moist and furred, red at edges; abdomen distended and tympanitic; tenderness and gurgling in right iliac fossa; one watery stool. Ordered milk, beef-tea, and Aq. Camphoræ. Oct. 20 (14th day). Pulse 120. A circumscribed pink flush on left cheek. Much pain in abdomen, and has passed six copious watery stools of an ochrey colour in last twenty-four hours. Ordered acetate of lead (gr. iij.) every four hours. Oct. 21 (15th day). Is more prostrate. Pulse 104, and weaker. Moans very much in sleep, but has no delirium, and intelligence seems clear, although she drawls out replies, and expression is very listless and languid. Pupils much dilated; slight deafness. Left cheek much flushed; several fresh spots; skin hot and dry, but nurse says she perspires always in the night. Tongue moist and furred; much tenderness in right iliac fossa; six stools, but less copious. Ordered a starch and laudanum enema, and six ounces of wine. Oct. 28. Has continued in same languid state for last week. Has had no delirium, and, although for last day or two she has been somewhat drowsy, she always replies when spoken to in same drawling way as before. Pupils have been always dilated. A few fresh spots have appeared almost daily, and perspiration has returned almost every night, although skin has been hot and dry in day-time. Has only had two stools in last 24 hours, but this morning she vomited about two ounces of green bilious fluid, and abdomen is more distended. Ordered a turpentine-stupe to abdomen, and a starch and laudanum enema. Oct. 30 (24th day). Pulse 88. Is very weak, but feels and looks better; intelligence clear, and she answers more quickly; pupils still large. The spots have almost disappeared, and there has been no stool since yesterday morning. Ordered a mixture containing carbonate of ammonia. Nov. 1 (26th day). Pulse 112. Continues to improve. Complains of pains in back and limbs. No spots visible, and only one stool since Oct. 30. Appetite returning. Ordered a lightly boiled egg. Nov. 3 (28th day). Pulse 100. One fresh spot has appeared to-day. No motion for two days, and is very hungry; but abdomen is more distended. Wine to be reduced to four ounces; to have two eggs, and quinine and mineral acid. Nov. 6 (31st day). Pulse 96. Spot marked on 3rd continues, but there are no fresh ones. Two stools yesterday, and one to-day, more watery. Has still much flushing of face. Nov. 9. Pulse 92. Tongue moist and clean; one natural stool; no spots visible. Was ordered fish. From this date, patient improved daily, but she was much emaciated, and was long in regaining her flesh and strength. On Nov. 20, she got up, and on Dec. 11, she was discharged from Hospital.

CASE XLIV. *Enteric Fever. No diarrhœa. Mild attack lasting Three Weeks. Pulse—and Temperature—Range.*

Eliza L—, aged 22, adm. into Middlesex Hosp. March 4th, 1869, on 10th day of an attack of fever. Symptoms before admission had been shivering, headache, nausea, loss of appetite, thirst, no diarrhœa,

daily increasing prostration, and sleeplessness. Symptoms in hospital were: pyrexia with evening exacerbations, and perspirations during sleep; tongue moist and white with red edges; no diarrhoea; distinct rose spots from 10th to 16th day. About 22nd day tongue cleared and appetite returned; on 32nd day was ordered meat diet, and on 42nd day left hospital well. The treatment consisted in dilute hydrochloric acid, occasional opiate at night, milk and beef-tea.

TABLE XLVII.

Day of Illness	Pulse		Temperature		Day of Illness	Pulse		Temperature	
	M.	E.	M.	E.		M.	E.	M.	E.
10	108	112	101'6	103'	17	104	104	100'	100'2
11	108	120	102'	103'2	18	108	100	99'4	101'6
12	100	120	100'	103'	19	108	108	99'4	100'
13	100	120	102'6	103'	20	100	112	99'	99'4
14	106	124	101'6	103'	21	100	104	99'	99'
15	108	112	101'	103'4	22	96	88	98'	98'4
16	112	112	100'2	102'6	23	88	80	98'	98'1

CASE XLV. *Enteric Fever. Severe attack lasting Four Weeks, Diarrhoea, Delirium, and Congestion of Lungs. Intestinal Hæmorrhage and threatened Peritonitis. Pulse—Respiration—and Temperature—Range.*

Edward P—, aged 21, adm. into Middlesex Hosp. March 16th, 1869, on 8th day of an attack of fever, the symptoms of which had

TABLE XLVIII.

Day of Illness.	9 A.M.			2 P.M.			9 P.M.		
	Pulse	Resp.	Temp.	Pulse	Resp.	Temp.	Pulse	Resp.	Temp.
8	...	...	...	92	22	102'2	100	24	102'
9	108	28	102'4	108	32	104'3	100	32	104'
10	104	24	102'8	116	24	104'4	112	32	102'6
11	112	32	102'6	116	28	103'6	104	32	103'4
12	104	42	104'2	112	36	103'8	128	32	104'2
13	116	32	104'	106	36	103'2	124	32	102'6
14	112	32	103'2	104	36	103'6	108	36	102'4
15	108	32	103'	112	40	102'4	112	40	102'2
16	108	40	101'	108	48	101'8	120	44	102'2
17	112	48	101'4	104	40	101'8	112	42	102'
18	112	56	101'	108	44	101'	116	38	101'4
19	112	44	101'	112	44	101'4	112	34	101'
20	112	48	102'	108	40	102'	120	40	101'
21	108	40	102.	108	40	102'4	104	36	101'7
22	112	40	101'2	108	44	101'8	108	40	101'3
23	112	40	100'	108	36	99'8	120	32	102'
24	124	36	102'4	116	35	102'8	128	32	102'6
25	108	32	101'4	128	36	101'4	124	36	102'
26	108	20	99'	120	32	101'6	120	28	101'4
27	112	28	100'	106	28	100'5	120	32	100'
28	112	24	98'	104	28	98'	112	32	98'6
29	112	24	98'2	108	28	98'	100	30	98'4

been general prostration, headache, vertigo, and pains in the limbs, with urgent vomiting and diarrhoea following the action of a purgative. After admission, the symptoms were diarrhoea more or less urgent up to 24th day, with considerable hæmorrhage from the bowels on the night of the 20th day; tongue at first moist and white, with red tip and edges, but on 12th day becoming smooth, red, and dry; abdomen distended; several crops of rose spots from the 8th to the 16th day; restlessness and delirium alternating with stupor from the 12th to the 22nd day; bronchitis and hypostatic congestion of the lungs from the 12th to the 28th day; great abdominal distension, with thoracic breathing, from the 23rd to the 27th day. On the 28th day there was a marked improvement of all the symptoms, and from this date convalescence advanced until patient left hospital on 57th day. /s

CASE XLVI. *Enteric Fever, of a severe form, lasting upwards of Four Weeks, with Delirium and Fatuity during Convalescence.*

John M——, aged 16, adm. into L. F. Hosp. Sept. 10, 1858, having suffered for a fortnight from febrile symptoms, headache, and diarrhoea. For four days before admission, he had been very delirious. Sept. 11 (15th day). Pulse 96, and compressible. Incessant delirium. Talks incoherently about money and railways, laughs at one time and swears at another. Is with difficulty kept in bed. Looks steadfastly at any one who speaks to him, and then bursts out laughing. Pupils natural; countenance pale. Five or six lenticular spots on abdomen. Lips parched; tongue red and dry. Abdomen distended. Five light-yellow watery stools since admission. Was ordered beef-tea and milk; four ounces of wine; acetate of lead (gr. iij.) after each motion; and a starch and laudanum enema. Sept. 12 (16th day). Pulse 120. Temp. in axilla 105° Fahr. Several fresh spots. Tongue brown, dry, and fissured. Purging quite ceased after second dose of lead. Sept. 16 (20th day). Pulse 112. Much more prostrate; hands and tongue tremulous. Noisy delirium has continued ever since admission, except when sleep has been procured for an hour or two, by means of an opiate draught. Pupils small. Several fresh spots have appeared daily, and many of those marked since admission are no longer visible. Is now sweating profusely, and abdomen and chest covered with sudamina. Lips bleeding from being picked; sordes on teeth; tongue dry and brown; intense thirst; much tenderness of abdomen. The diarrhoea returned on 14th, but has again ceased, after a repetition of the lead. Slight epistaxis. Temp. in axilla 104° Fahr. Urine 20½ ounces, containing 292 grains of urea. Six ounces of brandy substituted for wine. Sept. 18 (22nd day). Yesterday pulse was 144; to-day it is 112, and weak; but cardiac impulse strong and thumping. Is still talkative at times, but is, on whole, much quieter, and is drowsy and almost unconscious; pupils small. Has had no opium for two days. Still perspiring, but skin is at other times dry. Fresh spots continue to appear. Tongue dry, red, and fissured. Much retching, but brings up nothing. Great tympanitis, and much tenderness of abdomen. X

One stool, viscid, like bird-lime, and extremely offensive. Temp. 102° . Urine thirty ounces, alkaline, and containing 367 grains of urea. Ordered ten ounces of brandy, and a mixture of ammonia and ether. *Sept. 20 (24th day)*. Much worse. Pulse 108. Is quite unconscious and very drowsy, with occasional low muttering delirium. Pupils contracted. Much tremor, subsultus, and carphology; stools and urine passed in bed. Bowels more relaxed. *Sept. 22*. In same state. Occasional flushes on cheeks. Skin over sacrum is red. *Sept. 23 (27th day)*. Marked improvement. Pulse 98. Takes more notice, and is less drowsy, but at times shouts and talks nonsense. Subsultus and carphology ceased, and has less tremors. Pupils natural. Spots fading, and no fresh ones. Tongue moist and very red. Still retches much, but brings up nothing. Abdomen tender. One stool, not in bed. Temp. 100° . Urine $31\frac{1}{4}$ ounces, containing 503 grains of urea. *Sept. 25 (29th day)*. Is worse again. Pulse 96. Much tremor, and is quite unconscious. Spots have all disappeared. Temperature $100\frac{3}{4}^{\circ}$. Urine 28 ounces,¹ containing 368 grains of urea. *Sept. 28 (32nd day)*. Pulse 92. Is better again. Quite sensible when spoken to. Slept at intervals during night. Pupils large. No spots. Tongue red and moist; four relaxed stools. Temp. $100\frac{1}{2}^{\circ}$. Urine 42 ounces, containing 638 grains of urea. Small bed-sore over sacrum. On *Sept. 30*, the patient passed $75\frac{1}{2}$ ounces of urine, containing 964 grains of urea, and on *Oct. 2*, $59\frac{1}{2}$ ounces, containing 703 grains of urea. From *Sept. 28*, he gradually improved, but for a fortnight he was very talkative at times, and silly in his remarks. All this time, the pulse varied from 84 to 120; the pupils were large; the appetite voracious; and patient complained bitterly of pains in joints and limbs. On *Oct. 17*, he was able to get up; and on *Oct. 29*, he was discharged from Hospital.

CASE XLVII. *Enteric Fever. Acute Delirium followed by Coma and Death on 6th day. No Diarrhœa. Autopsy:—Extensive Deposit in Peyer's Patches, but no Ulceration. Enlargement of Mesenteric Glands.*

Arthur F——, aged 6, adm. into L. F. Hosp. *Aug. 20*, 1856. His brother had been admitted on *Aug. 8*, with enteric fever, characterized by numerous lenticular spots and profuse diarrhœa. Arthur F—— had only been taken ill on *Aug. 17*. His symptoms, before admission, had been great thirst, severe headache, and restlessness; during the two nights preceding admission he had been delirious, but bowels had not been relaxed. *Aug. 21 (5th day)*. Pulse 112. Very restless and delirious in night; but intelligence is now clear. Three lenticular rose-spots on chest. Tongue dry, red, and glazed. Abdomen distended and tympanitic, but not tender. No stool since admission. Was ordered milk and beef-tea, and one teaspoonful of castor-oil.

¹ About 4 ounces more of urine were passed with motion.

Aug. 22 (6th day). Last night, patient again became very restless and delirious, and to-day is quite unconscious and very prostrate; has had no motion of bowels. Wine and carbonate of ammonia were administered freely; but patient gradually sank, and died at 1.30 p.m.

Autopsy, 49 hours after death. Left side of heart firmly contracted; right side full of dark fluid blood; lungs healthy. Peyer's patches, and solitary glands of ileum much elevated and indurated from morbid deposit. Surface of patches was rough and granular, but no ulceration could be discovered. Edges of patches, and corresponding portions of peritoneum were red and vascular, but there was no increased vascularity of mucous membrane generally. The morbid changes in the intestinal glands were most developed towards cæcum, and mesenteric glands corresponding to this part much enlarged. Spleen very large and soft. Kidneys appeared healthy.

CASE XLVIII. *Enteric Fever, with Acute Delirium and Pulmonary Complication. Death about 15th day. Autopsy:—Ulcers in Ileum, with adherent Sloughs. Enlargement of Spleen and Mesenteric Glands. Lobular Pneumonia, etc.*

William B—, aged 11, adm. into L. F. Hosp. *Aug. 28th, 1858.* He had been ill for about twelve days, and in bed a week. His chief complaints had been chilliness, loss of appetite, thirst, and headache. No diarrhoea until day before admission, when he passed two watery stools. During two nights preceding admission, he had been very delirious. *Aug. 28th (13th day).* Pulse 112. Respirations 40; crepitation at bases of both lungs, and slight dulness at left base. Constant noisy delirium, and is with difficulty kept in bed. Pupils dilated. Skin very hot and dry. Temp. in axilla 104° Fahr. A circumscribed deep-pink flush on both cheeks. A good many lenticular spots on abdomen and back. Has been picking lips till they bleed. Tongue deep-red, dry, glazed, and fissured. Intense thirst. Abdomen distended and tympanitic, with gurgling and tenderness in right iliac fossa. No motion to-day. Was ordered beef-tea, milk four ounces of wine, and turpentine-stupes to chest. *Aug. 29th (14th day).* Pulse 112. Resp. 36. Is more prostrate. Urine passed in bed. Slept for a few hours last night, after two doses of $\mathfrak{m}$. x. Liq. Morph. Acet. Is still delirious, but is inclined to sleep. Pupils small. Several fresh spots. Tongue dry and brown along centre; two watery motions. Was ordered six ounces of brandy. Became very noisy and delirious in night. On following morning, quite unconscious, and he died at 9.0 a.m.

Autopsy, 33 hours after death.—Rigidity well marked. Body moderately thin. No spots visible on skin. Veins on surface of brain empty over anterior half; full, posteriorly. No opacity of membranes. No sub-arachnoid fluid on hemispheres. Half-a-drachm of serum in each lateral ventricle, and about four drachms at base. Brain-substance firm; bloody points rather numerous. Heart healthy. Slight

hypostatic congestion of both lungs. Scattered through both lungs were a number of isolated nodules, about the size of hazel-nuts, the tissue of which was very hyperæmic, friable, and scarcely crepitant, but not granular on section. Right lung 12 ounces; left, 13 ounces. Peritoneum contained about six ounces of clear serum. Stomach healthy. The six Peyer's patches nearest to cæcum were indurated, and raised one-tenth of an inch above mucous membrane. Peritoneum corresponding to these patches brightly injected. Solitary glands in lower four inches of ileum, and in cæcum and ascending colon, also much enlarged from morbid deposit. Ulceration had commenced in all of diseased Peyer's patches, and in most of solitary glands, but surfaces of all ulcers were covered with yellowish-brown sloughs, still firmly-adherent. Small intestine was contracted and empty, and was invaginated to the length of about two inches, at three different places; the invaginations were readily reduced. Colon distended with gas. Mesenteric glands near cæcum much enlarged, some of them equalling a pigeon's egg in size. Spleen weighed 13 ounces. Gall-bladder contained pale watery bile. Kidneys hyperæmic, but appeared healthy.

CASE XLIX. *Enteric Fever with Acute Delirium and Pulmonary Complication. Death on 21st day. Autopsy: Lobular Pneumonia. Intestinal Ulceration very limited; Sloughs mostly detached. Enlargement of Spleen and Mesenteric Glands.*

Harry B—, aged 19, adm. into L. F. Hosp., Oct. 6th, 1858. Little information could be obtained respecting state before admission, except that he had been ill about fifteen days, and in bed a week; that his bowels had been relaxed, and that he had been delirious for several days.

Oct. 7th (17th day). Pulse 108. Very noisy and delirious in night; but to-day answers when spoken to; pupils much dilated. Skin hot and dry; several lenticular rose-spots on abdomen. Tongue moist and red at tip. Abdomen tender and tympanitic; two light, watery stools. Ordered Aq. Camphoræ, beef-tea, milk, and four ounces of wine. Oct. 8th. Pulse 96. Very delirious in night. Tongue dry, red, glazed, and fissured; three stools. Oct. 10th (20th day). This morning became rather suddenly worse. Pulse 120. Respirations 36; moist râles all over chest, but no decided dulness. Very noisy and delirious in night, but to day rather drowsy, with occasional muttering delirium. Pupils less dilated, but still larger than natural. A circumscribed flush on both cheeks of an almost livid hue. Several fresh spots. Tongue clean, red, glazed, and fissured. Much tenderness in right iliac region; one stool. Ordered eight ounces of brandy, and a mixture containing ammonia and chloric ether. Died at 5 a.m. on Oct. 11th. Quite unconscious for several hours before death.

Autopsy, 29 hours after death. Limbs rigid. No spots visible on skin. Right lung 30 ounces; left, 24 ounces. Both lungs, but especially right, contained a number of circumscribed nodules of

granular consolidation, varying in size from a pea to a walnut. The greater portion of small intestine, and whole of colon healthy. The disease was limited to lower eight inches of ileum. Mucous membrane, for three or four inches above valve, was one mass of ulceration, surface of which was clean, and edges not at all thickened. Above this, were several small ulcers, none larger than a sixpence, the surfaces of which were likewise clean, and in which cicatrization appeared to have commenced; to one only of them a yellowish slough was loosely adherent. Mesenteric glands much congested and enlarged, but none exceeded a cherry in size. Spleen 17 ounces, dark and soft. Gall-bladder distended with a thin, almost colourless, fluid. Kidneys enlarged, each weighing 6 ounces; capsules non-adherent; surfaces smooth; cortical substance hypertrophied. /

CASE L. *Enteric Fever, at first mild and simulating Remittent Fever. Pulse remarkably quick. Acute Delirium about 26th day, followed by Typhoid Symptoms and Death about 30th day. Autopsy: Ulcers of Ileum in process of reparation. Mesenteric Glands and Spleen only slightly enlarged.*

Margaret C——, aged 21, adm. into L. F. Hosp., Sept. 22nd, 1858. Cannot state precise day on which she began to feel ill; but it was about eleven days before admission. Has only kept bed for one day. Chief symptoms have been weakness, loss of appetite, pains in limbs, and feverishness towards night.

Sept. 23rd. Pulse 108 in morning, and 120 in afternoon. Restless in the night and slept badly, but intelligence clear and expression almost natural. Skin hot. No eruption. Tongue moist and furred, very red at edges; abdomen distended and tympanitic, with considerable tenderness. Five light watery stools. Ordered milk and beef-tea, and a mixture containing Acetate of Lead (gr. iij.) and Liq. Morph. Acet. (mij.) after each motion of bowels. Sept. 25th. Pulse 120 in afternoon, but in morning only 90. Intelligence clear; slept at intervals; no delirium; eyelids drooping and pupils dilated; expression languid. Temp. under tongue 104° Fahr.; a circumscribed flush on left cheek; two indistinct lenticular spots on back. Tongue moist and almost clean, red at tip; occasional vomiting of bilious fluid; one liquid stool. Urine 19 ounces, rather dark, and contains 422 grains of urea. Ordered four ounces of wine, Carb. of Ammonia, and turpentine-stupes to abdomen. For following week, patient continued much in same state. Pulse varied much, but was always quickest in afternoon, when it was sometimes as high as 130. Intelligence remained clear, and patient slept tolerably well, but pupils were dilated and eyelids drooped. No more spots could be discovered, although they were looked for daily; but there was usually a circumscribed pink flush on one or both cheeks. The skin was moist in morning, and dry in afternoon; in the night, there was considerable perspiration. Occasional vomiting and slight diarrhoea. Oct. 2nd X

(22nd day.) Not so well. Pulse 150 in afternoon. Did not sleep so well, but intelligence clear; pupils large. Temp. $105\frac{1}{4}^{\circ}$ under tongue. Has been perspiring very much, and to-day there are several distinct lenticular rose spots on back. Tongue moist and furred, red at edges; two light watery stools. Ordered six ounces of brandy. Oct. 3rd. Pulse 154. Slight delirium in night, and is rather drowsy, but intelligence clear. Insists that she is going to die. Pupils natural; skin dry, but perspired in night: three or four fresh spots on abdomen. Tongue dry and red along centre; no motion of bowels. Temp. $104\frac{1}{2}^{\circ}$; urine $25\frac{1}{2}$ ounces, containing 352 grains of urea. Oct. 5th. Pulse 160; respirations 28. Slept after opiate draught and has had no return of delirium. Several fresh spots. Tongue dry and red; no motion for three days. Urine $21\frac{3}{4}$ ounces, containing 490 grains of urea. Brandy increased to 8 ounces, and was ordered a mixture containing ammonia and chloric ether. Oct. 7th (27th day). Pulse upwards of 160; respirations 36; is very prostrate. Very restless in night, and occasionally talked nonsense. To-day is dull and stupid; pupils rather small; is sweating profusely, and has copious sudamina on chest and abdomen; several fresh spots; tongue dry, red, and clean; occasional sickness, and brings up a yellowish liquid; bowels opened by an enema; urine 17 ounces, containing 394 grains of urea. Brandy increased to 12 ounces.

In the night of Oct. 7th, the patient became violently delirious, and on Oct. 8th she was scarcely conscious. Constant floccitatio and occasional subsultus; urine passed in bed; pupils again dilated; eyes open and staring. Continued in same state until evening of Oct. 11th, when carphology ceased, and she became much more conscious, and bade adieu to her sister, telling her she would be dead before morning. Pulse too quick to count; respirations 46; a few fresh spots. Oct. 12th. Gradually sank, and died at $8\frac{1}{2}$ a.m.

Autopsy 29 hours after death.—Slight rigidity; no spots visible on skin; body much emaciated. Arachnoid slightly raised above convolutions by serosity. Two drachms of serous fluid in each lateral ventricle, and more than half an ounce at base. No abnormal vascularity of pia mater nor of brain-substance. Brain 50 ounces, firm. Right lung 15 ounces, and left $15\frac{1}{2}$ ounces; indications of old tubercle at both apices; but lungs, in other respects, healthy. Heart 7 ounces; right cavities filled with a dark clot, like currant-jelly; left empty.

Stomach healthy. Numerous ulcers in lower three feet of ileum, corresponding to Peyer's patches; the largest were near cæcum; no induration nor thickening at their bases or edges; some were surrounded by a loose fringe of mucous membrane, but in others the mucous membrane appeared continuous with surface of ulcer. One ulcer, more than two feet above valve, had its edge considerably thickened, and a large yellowish-brown slough loosely-adherent to its surface, and two other ulcers in this situation had minute specks of slough still adhering to them. Many of solitary glands likewise ulcerated. Mesenteric glands enlarged, but none exceeded a hazel-nut

in size. Spleen weighed only $5\frac{1}{2}$ ounces. Kidneys healthy. Gall-bladder distended with a limpid, almost colourless liquid, containing white flakes.

C.—ANALYSIS OF PRINCIPAL SYMPTOMS.

a. *The Physiognomy.*

The heavy, stupid expression, so characteristic of typhus, is comparatively rare in enteric fever. Many patients pass through this disease without any remarkable change of countenance. Even when they are unable to give coherent answers, the countenance may be little altered, with the exception of dilatation of the pupils, and an expression of languor, ennui, or sadness. But in severe cases, when the disease assumes the 'typhoid state,' the *facies typhosa* may be indistinguishable from that of typhus (see page 130). The countenance rarely presents that general flushing of a dusky tint, so common in typhus; but it is either abnormally pale, or there is a circumscribed pink flush on one or both cheeks, which I have never seen in typhus. This flush was present in 74 of 100 cases, of which I have careful notes. Jenner met with it in 11 of 23 fatal cases.^m It varies in intensity in different patients, and in the same patient at different times. ~~It~~ it often disappears entirely, and returns; as a rule, it is most marked in the afternoon and evening, and after the administration of food or stimulants. It occurs in mild as well as in severe cases; but, in the latter, it is usually of a deeper tint than in the former. Associated, as this appearance often is in the advanced stages of the disease, with great emaciation, sunken eyes, and rapid breathing, it forcibly recalls the aspect of persons in the hectic stage of pulmonary phthisis.

b. *Symptoms referable to the Skin.*

1. *The Eruption* of enteric fever consists of isolated lenticular spots—the '*taches roses, lenticulaires*' of Louis (see Plates III. IV. and V). Their colour is rose or pink, but varies slightly in tint, according to that of the patient's skin. Their form is rounded and regular; their margin is well-defined; and they measure from half a line to two lines in diameter. When the point of the finger is passed gently along the skin, each spot can in most cases be felt slightly elevated above the surface.

^m JENNER, 1849 (2).

Their outline is rounded and convex, but not acuminated. They are never indurated; but, in rare cases, a minute vesicle may be discovered at their apex.ⁿ They are never converted into petechiæ; but during the whole period of their existence they disappear completely on pressure, and return when the pressure is removed. They are never observed on the dead body. They are developed in successive crops, each spot lasting three, four, or five days, and then fading, while fresh spots continue to appear. I have verified this observation hundreds of times, by surrounding daily every fresh spot with a circle of ink, and writing the date of each on the skin.

The number of these spots is usually small; and hence they are often over-looked. In most cases, the number present at one time does not exceed twenty or thirty; and sometimes three or four spots are all that can be discovered. Occasionally, however, the spots are very numerous, and then the edges of two contiguous spots may cohere. Still this is a rare circumstance, and the spots are never seen to merge into irregular patches, as occurs in typhus. Of 98 cases in which I have notes of the eruption, the number of spots present at one time never exceeded 20 in 61; in 37 cases it exceeded 20; and in 9 cases it exceeded 100. In 1 of the cases I counted upwards of 1,000 spots at one time (see Case LI. and Plate IV); and several other cases where they were equally numerous have come under my notice. According to Barthez and Rilliet, with whose experience my own concurs, the spots are less numerous in young children than in adults. In most cases, these observers did not notice more than 6 at one time, and rarely so many as 20; in only 1 of 111 cases did they find them very numerous.^o

The most common situations of the spots are on the front of the chest and abdomen, and on the back. I have often succeeded in finding them on the back, when they existed nowhere else; and I have occasionally noted that they were larger and more numerous on the back than in front. This circumstance may be due to the greater warmth of the skin of the back, on which the patient lies. Louis and Jenner mention instances where the spots were developed in large numbers after a warm bath, and I have known them to appear first on a portion of skin to which a sinapism had been applied. In 8 of 98 cases,

ⁿ Jenner, Peacock, and W. T. Gairdner have also observed a minute vesicle at the apex of the spots, in exceptional cases. See JENNER, 1853, p. 285; PEACOCK, 1856 (No. 1); GAIRDNER, 1862 (No. 2), p. 125.

^o BARTHEZ and RILLIET, 1853, ii. p. 684.

T. W. T. Gairdner. May. 8/75

Man. middle age at Fairlie 6 weeks ago.
said to have been over a month in Brit-
tish with numerous white rose spots ^{still} present
& had been comatose since first appearance

I have noted the spots as present on the arms or legs, and in 1 case on the face.

The date of appearance of the spots is between the seventh and twelfth days (inclusive). It was so in 39 of 46 cases, in which I noted the point; in 4 cases only were the spots present before the sixth day, and then they appeared on the fifth day. On the other hand, in 3 cases they were not seen before the fourteenth day; and in 1 case, they did not appear until the twentieth day. In none of Chomel's cases was the eruption observed before the sixth day;^p and only in 1 case did Louis meet with it as early as the fifth day.^q In children, it appears rather earlier than in adults: Taupin, Barthez and Rilliet state that it occurs occasionally as early as the fourth day.^r

The duration of the eruption varies from seven to twenty-one days, according to the date of its first appearance and the total duration of the fever. As a rule, it disappears with the commencement of convalescence; but in certain cases, the spots continue to come out after the general symptoms have begun to improve, and the patient is apparently convalescent. It is well to be aware of this circumstance, for as long as the spots continue, a slight indiscretion may bring on an exacerbation of the febrile symptoms. The mean duration of the eruption in 30 cases which recovered under my care, and in which it was watched either from its first appearance or from the eighth day of the disease, was $14\frac{1}{2}$ days, the shortest period being 4 days, and the longest 35. In children, according to Barthez and Rilliet, the eruption rarely lasts longer than 7 or 8 days (see also page 19).^s

The eruption is not invariably present. Of 5,988 cases admitted into the London Fever Hospital during 23 years, it was noted in 4,606, or 76.92 per cent.; in some of the remaining 1,382 cases, the fact of the spots not being observed was perhaps due to their not having been looked for with sufficient care. Louis observed them in 160 out of 177 cases; and in the remaining 17 cases, with the exception of 5, he was unable to state positively that they were wholly absent.^t In America, Bartlett rarely failed to find them, when they were properly sought for.^u They are more frequently absent in patients over 30 and under 10 years of age, than in patients between 10 and

^p CHOMEL, 1834.

^q LOUIS, 1841, ii. 105.

^r TAUPIN, 1839; BARTHEZ and RILLIET, 1853, ii. 683.

^s Peacock failed to find it in 9 out of 62 cases (PEACOCK, 1856, No. 1). According to Parkes, they are absent in 20 per cent. (*Assoc. Med. Journ.* 1856, p. 993).

^t LOUIS, 1841, ii. pp. 96-105.

^u BARTLETT, 1856, p. 63.

30. Of 1,413 cases admitted into the Fever Hospital during 10 years, between the ages of 10 and 30, the eruption was observed in all except 142, or 10 per cent.; of 252 patients over 30, it was not observed in 40, or in nearly 16 per cent.; and of 107 cases under 10, it was not noted in 37, or $34\frac{1}{2}$ per cent. Jenner believed that the spots were comparatively rare above 30 years of age. Barthez and Rilliet failed to find them in one-fourth of 111 cases in young children; Taupin, on the other hand, noted them in 110 out of 121 children, and believed that they were as common in early, as in adult, life. As to sex, the eruption was unobserved in 127 of 905 males admitted into the London Fever Hospital; but in only 97 of 915 females.

There is no relation, as in typhus, between the presence or abundance of the eruption, and the severity of the disease. Of 37 cases in which I noted the spots as exceeding twenty at one time, 7 died; and of 61 cases where the spots never amounted to twenty, 12 died; so that the rate of mortality in the two classes was almost equal. Some writers, indeed, have regarded a copious eruption as a favourable sign, rather than otherwise.* Louis found the eruption more scanty, and oftener absent, in fatal cases than in those which recovered. Barthez and Rilliet are of opinion, that in children the spots are fewer and oftener absent in the severe cases than in the mild. Dietl, of Cracow, who has paid particular attention to the subject, thinks that the prognosis is usually most favourable in those cases where the eruption is most abundant.*

The following are the principal points of distinction between the spots of Enteric Fever and those of Typhus.

Enteric Fever.

1. Pink or rose-coloured throughout.
2. Undergo no change, until they fade or disappear. Never converted into petechiæ.
3. Circular.
4. Isolated and few in number.
5. No subcutaneous mottling.
6. Elevated above the skin.

Typhus.

1. May be dirty-pink or red at first, but soon become reddish-brown.
2. Become gradually darker, and are often converted into petechiæ.
3. Of irregular form.
4. Numerous and adhere in patches.
5. Mottling common, in addition to spots.
6. Not elevated, except at first appearance.

* See STEWART, 1840, p. 326.

* *Edin. Med. Journ.* 1856, ii. 365.



Enteric Fever.

7. Disappear on pressure, as long as they last.
8. Rarely appear before 7th day.
9. Appear in successive crops.
10. Each spot lasts only three or four days.
11. Never present on dead body.
12. A large number does not indicate danger.

Typhus.

7. Do not disappear on pressure, except at first.
8. Appear on 4th or 5th day.
9. Never in successive crops.
10. Many of the spots may last to the end of the fever.
11. Often persist after death.
12. Direct ratio between the number and darkness of the spots and the severity of the case.

It is important to determine whether the lenticular spots above described be ever present in other diseases than Enteric Fever. Louis, in the first edition of his work (1829), stated that he had found them in 12 cases of other acute diseases; but in the second edition (1841), he observed, that, in the intervening twelve years, he had sought for them in vain in every disease but 'typhoid fever,' and he was inclined to think that he had formerly mistaken ordinary pimples for the lenticular spots.^x Possibly, other observers have committed a similar error. Dr. Waller, of Prague, and Messrs. Barthez and Rilliet, state that they have met with lenticular rose-spots in cases of acute phthisis:^y but their observations require confirmation. At the London Fever Hospital, I have had occasion to examine many thousand cases of acute disease of every form, and my opinion is that an eruption, which presents all the characters above mentioned, is peculiar to Enteric Fever.

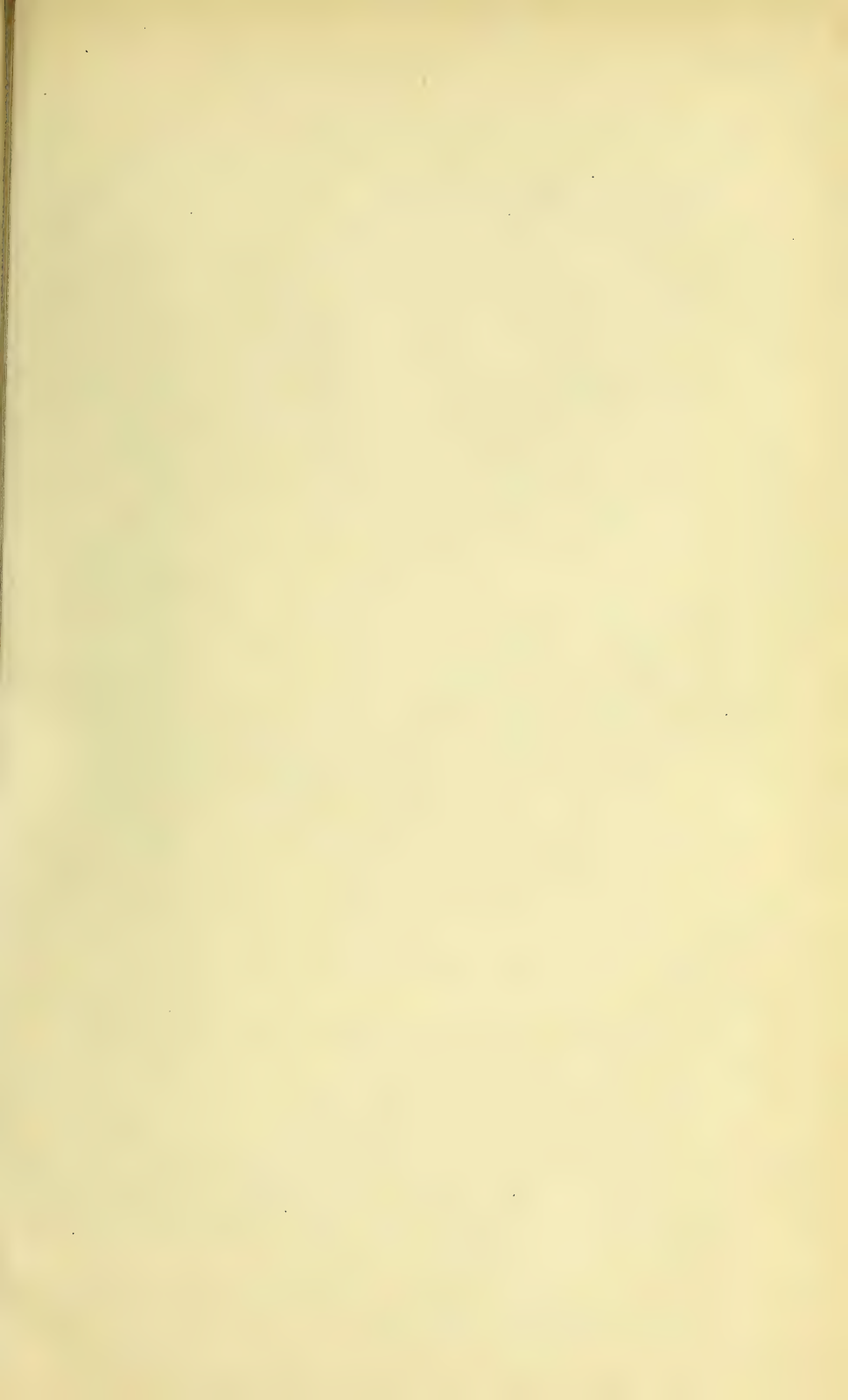
CASE LI. *Enteric Fever, with very Copious Eruption.*

Mary E——, aged 20, adm. into L. F. Hosp. Sept. 16, 1858. Her illness had commenced about ten days before admission with giddiness, nausea and vomiting, pain in the abdomen, and loss of appetite. From the first, the bowels had been open two or three times a day. Sept. 17th (12th day). Pulse 120. No headache. Intelligence good, but sleep very disturbed; physiognomy languid, but not at all stupid; pupils large. Skin hot; a circumscribed pink flush on one cheek. Two or three lenticular rose spots on abdomen. Tongue moist and furred, and red at edges; four ochrey watery stools. Was ordered beef-tea and milk. Sept. 18th (13th day). Pulse 114; weak. Temp. under tongue 104½° Fahr. Lenticular spots very numerous on chest,

^x LOUIS, 1841, ii. p. 107.

^y See JENNER, 1853, p. 465; also BARTHEZ and RILLIET, 1853, ii. 684, 697; and H. KENNEDY, *Lancet*, 1863, ii. 725.

abdomen, and arms; more than 200 counted on chest and abdomen alone. Belly tympanitic; gurgling and tenderness in right iliac fossa; four stools. Was ordered 4 ounces of wine and acetate of lead (gr. iij) after each motion. *Sept. 19th (14th day)*. Pulse 116. Is quieter and a little drowsy; but intelligence clear, and no delirium. Pupils dilated, and is rather deaf. Sixty fresh spots have appeared on front of chest and abdomen, and they are also very numerous on back, arms, and legs, and even a few on hands, feet, and face. *Sept. 21st (16th day)*. Pulse 124. Is more prostrate, and has slight tremor of the hands. Intelligence clear; but had slight delirium in the night. Circumscribed deep-pink flush on both cheeks. Lenticular spots still very numerous. During the last two days, 160 fresh ones have appeared on the chest and abdomen alone, while several of those marked on *Sept. 18th* are no longer visible. A few of the spots are fully a fifth of an inch in diameter; they are all elevated and rounded, and disappear completely on pressure. Although mostly isolated, two spots might be seen, here and there, with their edges in contact. The spots were calculated to exceed one thousand; their appearance on the abdomen is represented in Plate IV. Lips dry and cracked; tongue red and moist; six stools. Was ordered 8 ounces of wine, and chalk mixture with catechu. *Sept. 23rd (18th day)*. Pulse 120. More drowsy, and has occasional delirium; pupils rather large. Temp. under tongue $103\frac{1}{4}^{\circ}$ Fahr. Ninety fresh spots on chest and abdomen since *Sept. 21st*, and many of those previously marked have disappeared; still several on face. Four light, watery stools. Was ordered a mixture every four hours, containing acetate of lead (gr. iij.), and liq. morph. acet. (℥ iij), also a starch and opium enema at night. *Sept. 25th (20th day)*. Pulse 112. Answers when spoken to, but is very drowsy and confused; pupils rather small. Temp. under tongue $102\frac{1}{2}^{\circ}$ Fahr. Fifty fresh spots on chest and abdomen. Two stools. More prostrate, and tremors increased. Ordered 8 ounces of brandy. *Sept. 26th*. Twelve fresh spots on chest and abdomen. Tongue red and dry. No stool since yesterday morning. *Sept. 28th (23rd day)*. Pulse 114. Is more conscious. Temp. under tongue $101\frac{3}{4}^{\circ}$ Fahr. Spots much less numerous, and only twelve fresh ones on chest and abdomen in last two days. One stool. *Sept. 30th (25th day)*. Pulse 96. All the symptoms have improved. Temp. under tongue $99\frac{1}{2}^{\circ}$ Fahr. Spots less numerous, and only three fresh ones on chest and abdomen. Tongue moist and smooth; no stool. Yesterday passed 70 fluid-ounces of urine, containing 496 grains of urea, and to-day $43\frac{3}{4}$ fluid-ounces, containing 575 grains. Wine was substituted for brandy. *Oct. 2nd*. Pulse rose to 108 yesterday, but is to-day 84. Feels and looks much better. No fresh spots, and only six or seven of the old spots remain on front of chest and abdomen. Temp. $99\frac{1}{2}^{\circ}$ Fahr. *Oct. 5th (30th day)*. Pulse 80. Temp. 98° Fahr. Tongue clean and moist. One formed stool daily. Only a few traces of spots on back. Convalescent. *Oct. 22nd*. Discharged from Hospital, well.



2. *Scarlet Rash*. In many cases of enteric fever the appearance of the lenticular spots is preceded, for two or three days, by a delicate scarlet rash, all over the body, disappearing on pressure. (See Case XLV.) This is not peculiar to enteric fever, but occurs in other forms of pyrexia. It is best seen in patients with white delicate skins. Jenner mentions an instance, where this rash co-existed with slight sore-throat and the disease was mistaken for scarlatina.² Several similar cases have come under my own notice. Occasionally this hyperæmia persists throughout the fever; and in the advanced stages a red or purplish blush of the skin is sometimes observed on the dependent parts of the body.

3. *Purpura-spots and Vibices* I have met with in rare cases, several of which have recovered. Trousseau records a case in which there were extensive vibices.^a When petechiæ occur, they are not developed in the centre of the lenticular spots, but are independent.

4. *Taches bleuâtres*. Spots of a delicate blue tint—the ‘taches bleuâtres’ of French writers—are occasionally observed on the skin in cases of enteric fever. They are of an irregularly rounded form, and from three to eight lines in diameter. They are not in the least elevated above the skin, nor affected by pressure, even at their first appearance. They have a uniform tint throughout their extent, and they never pass through the successive stages observed in the spots of typhus. Two or three of them are sometimes confluent. They are most common on the abdomen, back, and thighs, and in several instances I have seen them distributed along the course of the small subcutaneous veins (see Plate V.) The cases where I have met with these spots have usually been mild; and Trousseau makes a similar observation.^b They occur in other diseases than enteric fever.

5. *Sudamina* are alluded to by most writers. Louis observed them in 104 out of 141 adults; and Taupin, in 104 of 121 children. They appear to be less common in England. Peacock met with them in only 22 of 52 cases; and Jenner, in only 7 of 23 fatal cases. I have noted them in about one-third of my cases. Their most common situation is on the front of the chest or abdomen. They usually appear in the third or fourth week of the disease, along with perspiration. From the

^a JENNER, 1850, xxii. p. 277; also BÄUMLER, 1866.

^a TROUSSEAU, 1861, p. 152.

^b See TROUSSEAU, 1861, p. 159; FORGET, 1841, p. 226; JENNER, 1850, xxiii, 313.

frequency with which Louis found sudamina, he was inclined to regard them as a specific character in 'typhoid fever,'^c but they are probably equally common in all febrile diseases attended with perspiration.

6. *Desquamation* of the cuticle, on the cessation of the fever, is chiefly observed in cases where sudamina have been present; but in many other cases, the skin, during convalescence, is rough from the separation of the cuticle in minute branny scales. The hair often falls out, and the nails may present markings similar to those which follow an attack of typhus (see page 136) and other acute diseases.^d

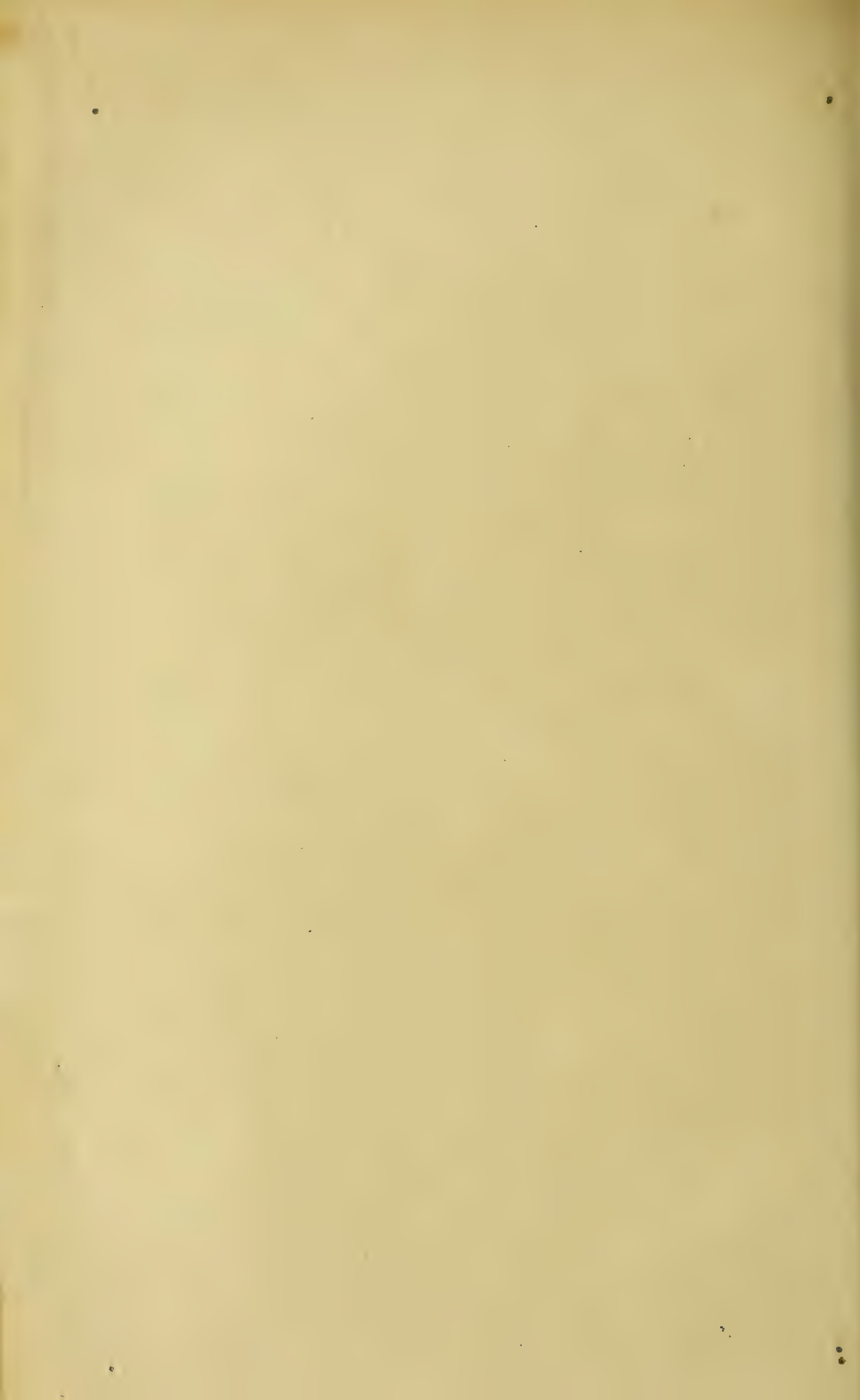
7. *The Temperature.* (Cases XLIV., XLV., LV., LVI., and Diagrams XV.-XVIII.)—Since the appearance of the first edition of this work, I have taken the temperature three times daily in many hundreds of cases of enteric fever. My observations agree in the main with those of Thierfelder, Wunderlich and other writers.

As a rule, from which there are few exceptions, the pyrexia lasts for at least three weeks. It is of a remittent type, or is characterized by morning remissions and evening exacerbations, which sometimes are observed throughout the malady, but are always present at the commencement, and are still more marked at the close in cases which recover.^e The rise of temperature at the onset is in a gradual zig-zag fashion, the temperatures each morning and evening being each day about a degree (Fahr) higher than those of the day preceding, but there being always a temporary arrest or remission of about 2° in the morning (Diag. XLIV.). Each day the temperature begins to rise about noon, and attains its maximum between 7 and 12 P.M.; and about midnight it begins again to fall, the greatest remission being usually between 6 and 8 A.M. Enteric fever would be excluded from the diagnosis, by a temperature approaching to normal on any evening during the first week, and on the other hand by a temperature of 104° on the first day or second morning of illness. The maximum evening temperature is usually reached between the fourth and sixth day, but sometimes not until the eighth day or later, and is usually about 104° or 105°, or it may be even 106°, but the diagnosis of enteric fever must not be excluded, as Wunderlich teaches, if it does not reach 103°. After attaining its maxi-

^c Louis, 1841, ii. 110.

^d See *Lancet*, 1870, i. 3.

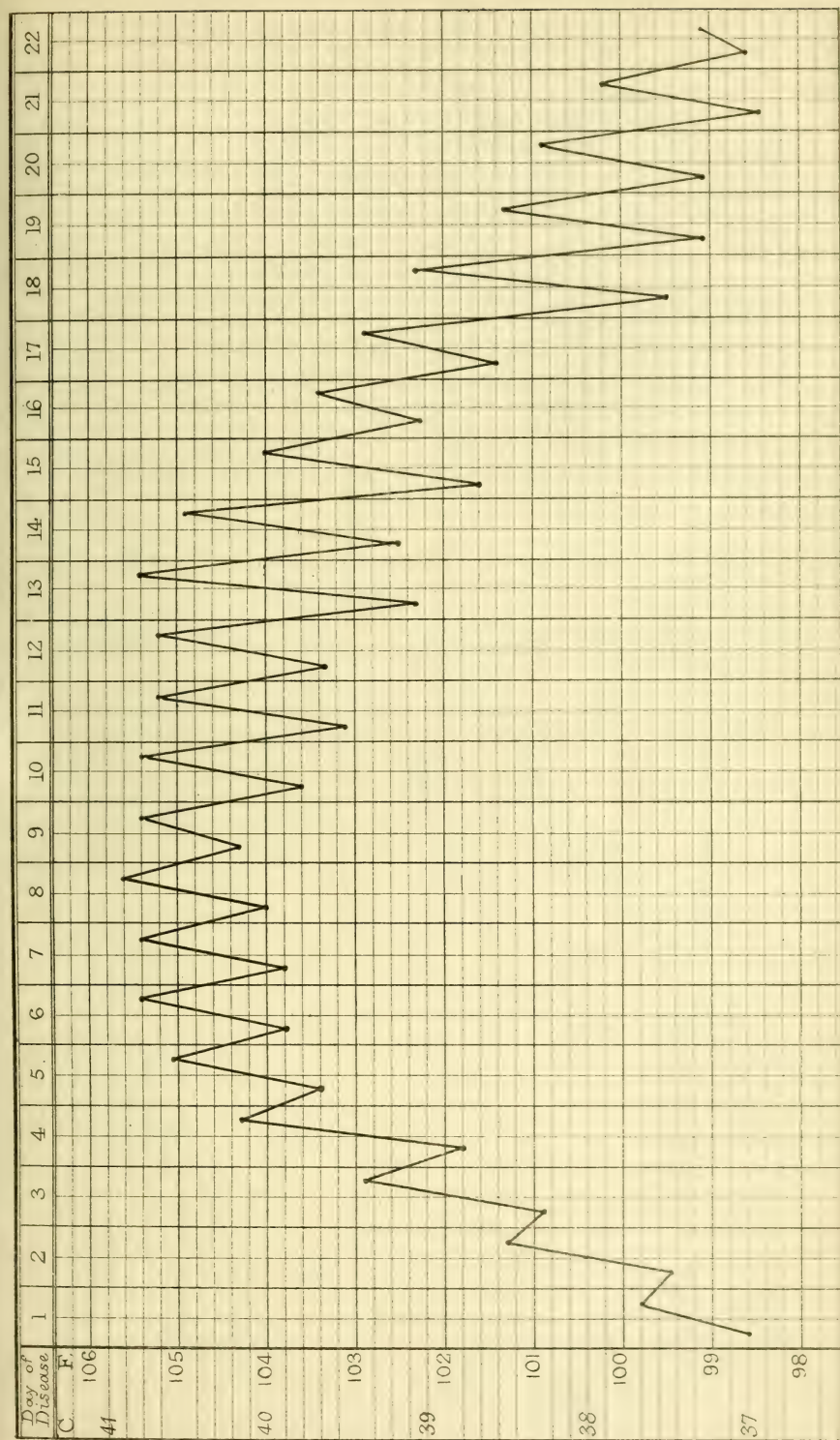
^e For an attempt to explain these variations in the degree of pyrexia, see H. IMMERMANN, 1869.



See Vallin, 1873



DIAGRAM XV. Temperature in a mild case of Enteric Fever from first day of attack. After Wunderlich.



2 mum, there is little change in the daily variations, except that perhaps the maximum may be scarcely so high, as long as deposit is taking place in the intestinal glands, or until about the twelfth day of the disease. At this time, which corresponds to the commencement of ulceration or absorption of the glands, the course taken by the temperature varies with the severity and duration of the case.

In mild cases at this time the morning remission becomes more decided, and the daily ascent begins later. At first there may be little difference in the evening rise, so that this may be 4° or 5° or even 9° (R. E. Thompson) in excess of the morning temperature; but soon the evening exacerbation also diminishes, and by the end of from six to twelve days, the evening temperature may be normal, which is the only certain proof of the fever having ended. During this lengthened defervescence the fever may be truly intermittent, the morning temperature being normal with a rise of several degrees towards evening.

In cases which run a severe and protracted course the morning remissions ~~do not become more~~ decided about the twelfth day, *less* but both the morning and the evening temperatures remain stationary, or become increased, and thus the fever may continue without any considerable remissions until some time during the fourth week, when defervescence takes place as in the milder form, although sometimes after decided but irregular remissions, which may extend into the evening, the temperature again rises owing to some complication or a recrudescence of the fever. In these severe cases the fever at any stage is apt to take an irregular course from the occurrence of complications. Before death the temperature may rise to 108° , or even to 108.95° (Ladé) or 110.3° (Wunderlich); but when death takes place by collapse, the temperature may sink previously to the normal standard or even below it.

Cases intermediate between the mild and severe forms are not uncommon.

A case of enteric fever must always be regarded as severe when the temperature rises, and the remissions become shorter and less decided, in the latter half of the second week; when the morning temperature rises to 104° , or is persistently 103° ; or when the evening temperature exceeds 105° . Recovery is rare after a morning temperature of 105° , or a temperature at any time of 107° , but Wunderlich mentions a case where recovery took place after a temperature of 107.825° ; 7

had been reached during a rigor in the course of the disease.^f A sudden and irregular rise of temperature, and especially one which reduces the morning fall more than it raises the evening rise, denotes some local complication; but profuse diarrhoea, epistaxis, or intestinal hæmorrhage will cause the temperature to fall. (Diagram XVI.) A sudden rise of the pulse with a fall of temperature after the fourteenth day points to intestinal hæmorrhage, even though no blood may yet have been passed from the bowel.

During convalescence, the temperature is often below the normal standard especially in the morning, but short though often considerable rises may be induced by slight causes, such as the first indulgence in animal food, the visit of friends, or any emotional excitement. A persistent rise can only result from some complication or a relapse.^g

8. *Moisture.* The skin is dry, as well as warm; but in most cases the dryness alternates with clamminess, or actual perspiration; some years ago I noted considerable perspiration in 19 of 84 cases, and since then I have met with several instances, in which there have been frequent and profuse perspirations with only temporary abatement of the fever. Perspiration usually occurs during the night, the skin in the day-time being dry.

9. *Odour.* There is rarely any peculiar odour given off by the skin in enteric fever (see page 138). An experienced nurse at the Fever Hospital once informed me, that she could always distinguish the typhus from the enteric cases, by the peculiar odour given off by the former, which was absent in the latter.

c. Symptoms referable to the Circulating System.

1. *The Pulse* is accelerated. Out of 100 cases, I ascertained that it exceeded the normal standard, at some time of the fever, in all but one; in 97 cases, it exceeded 90; in 85 cases, it exceeded 100; in 70 cases, it exceeded 110; in 32 cases, it exceeded 120; in 25 cases, it exceeded 130; in 10 cases, it was above 140; and in 2, above 150.

But the great peculiarity of the pulse of enteric fever is that its frequency varies greatly on different days and at different

^f According to Trousseau, 'a temperature of 106·7° or 107·6° Fahr. indicates inevitable death.

^g Consult THIERFELDER, 1855; WUNDERLICH, 1857 and 1871; LADÉ, 1866; BAÜMLER, 1866; COMPTON, 1866; R. E. THOMPSON, 1867; MILLER, 1868; T. J. MACLAGAN, 1869; and TROUSSEAU, *Clin. Med., Eng. Trans.* 1869, vol. iii. p. 338.

See Dr. Donkins case of hyptemp.
Lancet. ?

My case Oct 4/78 Beardsley.
Private Case Book.

Also Lancet - March 22 1879.

hours of the same day. These variations correspond in great measure, although not entirely, with the variations of temperature, the pulse rising in the evening and falling in the morning. There may be a difference of 10, 20, or even 30 beats between these two periods of the day. The differences are most marked in mild cases, and in the earlier stages of more severe forms of the disease. These variations in the pulse and temperature impart to many cases of enteric fever a distinctly remittent character, and the resemblance to remittent fever may be further increased by the remission being attended by perspiration, more or less profuse. With the commencement of convalescence, the pulse falls slowly; there is rarely any sudden reduction. At first, the morning fall may be more decided, but it is especially at this time that there is a want of correspondence between the temperature and the pulse. Irrespectively of any complications, and apparently from mere weakness or nervous irritability, the pulse often keeps up, or even increases in frequency, while the temperature is falling, and it often happens that the pulse is quicker in convalescence than it has been during the fever, although sometimes in convalescence it is abnormally slow (44), as in typhus (page 140)

At the same time, it is remarkable how low the pulse sometimes falls, even while the fever continues, as shown by the temperature and the eruption of fresh spots. In 6 out of 100 cases I found it fall to 60; in 2 other cases, to 56; and in a 9th case, to 52. In another case, it fell to 37, and never throughout the fever, exceeded 56, but it rose with convalescence to 66. Another fact, not so generally known as it ought to be, is that enteric fever may run its entire course with a pulse little if at all above the normal standard of frequency (60-80), the temperature, however, reaching 102° or 104°. I have met with not a few such cases, and Griesinger refers to others.

As a rule, those cases are most severe in which the pulse is quickest, and the prognosis is usually bad when, in an adult, the pulse persistently exceeds 120. Of 30 cases where I found the pulse never exceeded 110, not one died; whereas, of 70 cases where it was above 110, 21, or 30 per cent., died; of 32 cases where it was above 120, 15, or 47 per cent., died; of 25 cases where it was above 130, 13, or 52 per cent., died; and of 10 cases where it was above 140, 6 died. Two of the patients who recovered after the pulse had exceeded 140 were under ten years of age. Still, I have known cases prove fatal where

the pulse never reached 100; and in 8 of Louis's fatal cases the pulse never exceeded 90.^b

During the first week or ten days of the disease, the pulse often exhibits some resistance; but after this, or sometimes earlier, it is soft and compressible; and in the advanced stage it may be small, feeble, undulating, irregular, intermittent, or imperceptible (see page 140). Louis noted the pulse as irregular or intermittent in 7 out of 41 fatal cases, and in 6 out of 57 severe cases which recovered.

2. *Action of the Heart.* The impairment, or complete absence, of the impulse and first sound of the heart noted in typhus, may also occur in severe cases of enteric fever. For further details, the reader is referred to page 141.

d. Morbid Phenomena of the Respiratory System.

1. *The respiratory movements* in the advanced stages are usually quickened, independently of pulmonary complications. Of 60 cases in which they were counted daily, I found that they exceeded 20 in the minute in 50; 30, in 38; and 40, in 22; but in most of the cases where they exceeded 40, and in some others also, the lungs were diseased. The respirations vary with the pulse, but in those cases where the pulse is remarkably slow, there may be no corresponding diminution in the rate of respiration. Thus, in one case the pulse was 64 and the respirations 28; in another, the pulse was 58 and the respirations 26; and in a third case, the pulse was 42 and the respirations 48, although no pulmonary lesion could be discovered. Occasionally the breathing is irregular, noisy, or 'nervous,' as described under the head of typhus (page 142).

2. *The expired air* has not yet been sufficiently examined; but in severe cases, during the typhoid stage, the breath is very offensive, as in typhus. In several cases it has been found to contain ammonia.ⁱ

e. Morbid Phenomena presented by the Digestive Organs.

1. *The Tongue*, at first, is moist and covered with a thin white fur, while its tip and margin are unusually red. It may remain in this state throughout the attack; or, about the middle or end of the second week, it may become dry and

^b LOUIS, 1841, ii. 347.

ⁱ Vide ante, p. 145; and PARKES, 1871, p. 400.

brownish over a triangular space at the tip or along the centre, and afterwards it may be covered with a thick, brownish crust, or it may become clean, red, dry, glazed, and fissured.

Cases may prove fatal where the tongue has never been brown. Of 45 in 100 cases, where I noted the tongue as dry and brown, 16 died; but of the remainder, 5 were fatal, in which the tongue had never been dry. The tongue also was moist throughout in 16 of 40 fatal cases recorded by Louis, and in 6 of 20 fatal cases noted by Jenner.¹

A peculiarity of the tongue is its unusual redness, which may be confined to the tip and edges, or extend over the entire surface. I have noted this redness in 69 out of 100 cases. In 16 of the 69 cases, 5 of which were fatal, the entire tongue was red, and its surface clean, smooth, and glazed. Jenner noted this glazed appearance in 5 out of 20 fatal cases. Occasionally, I have seen the tongue of a bright scarlet hue, with enlarged papillæ, as in scarlatina.

Another character of the tongue is the existence of transverse fissures, often deep and painful. They were noted in 35 of my 100 cases, and in 4 of 20 fatal cases observed by Jenner. Louis mentions cases, where they proceeded to extensive ulceration, with great thickening of the tongue.

Inability to protrude the tongue is much rarer, even in fatal cases, than in typhus.

2. *Lips and Teeth.* The lips are usually parched, and in severe cases may crack and bleed, a condition which in children is often aggravated by picking. When the typhoid stage is developed, sordes collect on the teeth. In rare cases, hæmorrhage from the gums occurs.

3. *The Appetite* is usually lost, but, in mild cases it may continue throughout the disease. I have noted it as present in 11 out of 100 cases.

4. *Thirst* is usually complained of in the early stages. In 39 out of 100 cases, I have noted it as excessive.

5. *Dysphagia* (see *Pharyngitis*, under *Complications*).

6. *Nausea and retching* are common symptoms, especially at the commencement of the illness, which is in consequence often regarded as a simple 'bilious attack.' In 36 out of 100 cases I have noted vomiting. In 12 out of 63 of the cases, it was one of the earliest symptoms; ^k in the others it came on after

¹ LOUIS, 1841, i. 474; JENNER, 1849 (2).

^k In 37 of the 100 cases, it was not noted whether there had been any vomiting before admission.

the first week. In most of the cases, the vomiting was only occasional; but in 8 it was protracted and distressing. It was usually associated with some pain and tenderness at the epigastrium. Louis observed vomiting in 36 out of 108 cases, and epigastric pain or tenderness in 59 out of 110 cases.¹ Vomiting, at the commencement of the disease, I am inclined to regard as a favourable symptom, but an opposite opinion has been expressed by Peacock.^m In several cases, where it was very urgent, I have known the disease afterwards run a mild course. But when vomiting comes on after the second week, it is often the first symptom of peritonitis.

The vomited matter usually consists of a greenish bilious fluid. Chomel mentions one case, where it contained blood;ⁿ and in one instance I have known fæcal vomiting persist for 36 hours before death, which was due to perforation of the bowel.

7. *Meteorism* is observed in most cases. Out of 100 cases, I found that the abdomen was unusually resonant or distended at some period of the fever in 79, and in 17 the distension was great; but in 21 the abdomen remained flat throughout. Louis noted meteorism in 89 out of 134 cases.^o In one fatal case he observed it as early as the third day; but, as a rule, it does not supervene until after the first week. It is most developed in grave cases. Thus, in 21 fatal cases, I noted it in 20; while Jenner observed it in 18 out of 19 fatal cases. Of 17 cases in which I have noticed extreme tympanitis, death occurred in 7; while of 62 in which it was moderate or slight, only 14 died; and of 21, where it was absent, none died. Louis noticed great meteorism in one half of his fatal cases, but only in 7 of 88 cases which recovered. The distension is of a peculiar form, the convexity being from side to side, in place of from above downwards, owing to the flatus being chiefly contained in the colon. Unlike the meteorism of typhus (page 148), that of enteric fever is almost invariably associated with pain and tenderness of the abdomen and diarrhoea.

8. A sensation of *gurgling* is felt in many cases, when pressure is made rather abruptly in the right iliac region. According to Chomel, it is much more common in enteric fever than in ordinary diarrhoea. Some years ago I noted it in 31 out of 44 cases; but subsequent experience has satisfied me

¹ LOUIS, 1841, i. 459.

ⁿ CHOMEL, 1834, Case x.

^m *Lancet*, 1865, i. 117.

^o LOUIS, 1841, i. 452.

that it is absent in a larger proportion of cases than is indicated by these figures.

9. *Abdominal Pain and Tenderness* are common, but not necessary, symptoms. Patients often complain of pain in the abdomen; and still more frequently tenderness is elicited, when pressure is made in the right iliac region. I found tenderness at this part in 71 of 81 cases; 16 of the 71 died, but none of the remaining 10: of 5 patients, who complained of severe pain at the commencement of the disease, 3 died. Louis noted abdominal pain in 106 out of 127 cases; of 39 fatal cases, it was present in all, and in 16 on the first day; whereas of 31 mild cases, it was absent in 10, and in only 4 existed on the first day.^p Jenner noted abdominal pain in 15 out of 20 fatal cases.^q The motions are rarely accompanied by pain and never by tenesmus.

10. *The Spleen* is often much enlarged, and can be felt through the abdominal wall. The enlargement is greatest in persons under thirty years of age, and towards the close of the second week of the disease. In children, Taupin discovered considerable enlargement of the spleen in 109 out of 121 cases;^r but Barthez and Rilliet only met with it in 28 out of 105 cases.^s

11. *Diarrhœa* is the rule in enteric fever; and constipation the exception. I have noted diarrhœa in 93 out of 100 cases, and M. Barth observed it in 96 out of 101 cases at Paris.^t

Its intensity varies. In 23 of 84 cases, I found that the motions never exceeded three in the day; in 51, they numbered four or upwards; and in 19, they exceeded six. In many cases I have known them amount to twelve, or more. There is no relation between the intensity of the diarrhœa and the extent of intestinal disease found after death.

The date of commencement, and the duration, of the diarrhœa vary. Diarrhœa may be one of the first symptoms, as happened in 38 of my 100 cases, and then it may cease after a few days and not return, or it may be a prominent symptom throughout the illness. At other times the bowels are at first confined, and urgent diarrhœa follows the administration of an ordinary purgative. Occasionally, diarrhœa does not commence until the third or fourth week of the disease, and then it may be profuse.

Louis ascertained that those cases were most severe and

^p LOUIS, 1841, i. 445.

^q JENNER, 1849 (2).

^r TAUPIN, 1839.

^s BARTHEZ and RILLIET, 1853, ii. 677.

^t LOUIS, 1841, i. 439.

fatal, where the diarrhœa was most persistent and urgent; and this conclusion is borne out by my experience. Twelve years ago, I found that in 34 cases, where the diarrhœa from its severity or duration was noted as excessive, 10 died; but that only 10 died out of 59 cases, in which the diarrhœa was moderate or slight. Since then I have had under my care more than two thousand cases of enteric fever, and no fact appears to me to be better established than that the severity and danger of this disease are in direct proportion to the intensity of the diarrhœa.

Diarrhœa is not invariably present (see Cases XLV. and XLVII.). In 7 of my 100 cases observed before 1862, it existed at no stage of the disease; and in 4, there was constipation. Subsequent experience has satisfied me that diarrhœa is absent in a much larger proportion of cases than I have now indicated (in fully one-fifth): and that these cases are usually mild and recover. Bartlett and Flint^u also speak of diarrhœa as often absent in mild cases. Cases, however, in which there has been no diarrhœa are sometimes fatal; one of my 7 cases above referred to died. There was also no diarrhœa in 3 fatal cases recorded by Louis, and in 2 observed by Jenner. Diarrhœa may be absent in cases where the ulceration is most extensive and advancing to perforation. I have repeatedly known profuse hæmorrhage or perforation occur, where previously there had been neither diarrhœa nor any other abdominal symptom. Jenner records the case of a female, whose bowels had all along been confined, but who died on the twenty-fifth day of profuse hæmorrhage from the bowels.^v A similar case is related by Hudson.^w Wilks mentions the case of a girl who died at the end of the third week; her bowels had been confined, and after death the small intestines were found filled with firm scybala, with an ulcer beneath each.^x In several cases where a relapse has occurred, I have known the bowels constipated throughout the primary attack, and relaxed during the relapse.

12. *The Characters of the Stools* in enteric fever are peculiar. They are liquid, and of the colour of yellow-ochre; their odour is very offensive and often ammoniacal; and their reaction is alkaline, whereas the fæces in health are always acid. Simon, Marklein, Parkes,^y and Lehmann,^z all attest their alkaline

^u FLINT, 1852; BARTLETT, 1856, p. 58.

^w HUDSON, 1867, p. 290. ^x WILKS, 1855.

^z *Physiol. Chem.* DAY'S Transl. i. 150.

^v JENNER, 1849 (2).

^y PARKES, 1850, p. 396.

character, and I have repeatedly confirmed their observations; according to Parkes, the alkalinity is due both to carbonate of ammonia and a fixed alkali. On standing, the stool separates into two layers,—a supernatant fluid, and a flaky sediment. The former has a yellowish, or pale-brown colour; its specific gravity is about 1015, and it contains about 40 parts in 1000 of solid matter, which consists chiefly of albumen and soluble salts, particularly chloride of sodium.^a The deposit is made up of particles of undigested food, disintegrating intestinal epithelium and blood-corpuscles, shreds of sloughs which have separated from the intestinal ulcers, and multitudes of crystals of triple phosphate. The existence of crystals of triple phosphate in the stools of ‘abdominal typhus’ was pointed out by Schönlein in 1835,^b and has been referred to by Gluge,^c Parkes, and many other observers. Schönlein imagined that they were peculiar to this disease; but they are now known to be abundant in all diseases; where, as in enteric fever, the stools have a marked tendency to decomposition. These characters of the stools are best seen after the tenth day of the disease; sloughs are not found before the fourteenth day. In some cases, the stools, instead of being watery, are pultaceous, frothy as if fermenting, and so light as to float on water; at other times I have known them to resemble mud or bird-lime; or they may contain blood.

13. *Intestinal Hæmorrhage* is an important symptom. It occurred in 8 out of 134 cases noted by Louis,^d and in 7 out of 21 fatal cases noted by Jenner.^e In children, it appears to be rarer than in adults: out of 232 cases under 15 years of age observed by Messrs. Taupin, Rilliet, and Barthéz, it occurred only once.^f

The quantity of blood lost may vary from a few drops to several pints. Copious hæmorrhage (over six ounces) occurred in 58 of 1564 cases under my care, or in 3.77 per cent. The blood is usually fluid; but sometimes, clotted. Its colour is sometimes dark, but oftener bright red, owing to the alkaline condition of the intestinal contents. The cases in which copious intestinal hæmorrhage occurs have for the most part, but not necessarily, been previously severe, and attended by much diarrhœa. In 18 of my 60^g cases the antecedent sym-

^a PARKES, *loc. cit.*

^b SCHÖNLEIN, 1836.

^c GLUGE, 1837.

^d LOUIS, 1841, i. 433-9.

^e JENNER, 1849 (2).

^f BARTHEZ and RILLIET, 1853, ii. 705.

^g This number includes 2 observed in Middlesex Hospital.

ptoms were mild; and it is important to note that in 8 cases (of which 6 were fatal) the bowels up to the occurrence of the hæmorrhage had been constipated. Of the 60 cases the bleeding commenced during the second week (mostly towards its close) in 8; during the third week, in 28; during the fourth, in 17; during the fifth, in 1; during the sixth, in 3; during the seventh, in 1; and during the eighth week in 1; while in one case the date of its occurrence was not noted. In 3 cases, where it took place on the sixteenth, eighteenth, and nineteenth days, it recurred on the forty-ninth, thirty-third, and forty-fourth days. Several times I have known extensive hæmorrhage take place into the bowel, and the patient die, before any blood has been voided externally. This occurrence, which Trousseau speaks of as not uncommon, may be suspected whenever there is a sudden increase of the prostration, with pallor of the surface, the pulse increasing in frequency while the temperature falls. In any case of extensive intestinal hæmorrhage the temperature suddenly falls, (Diag. XVI.) sometimes to below the normal standard; but it speedily regains its former height, or rises beyond it. Hæmorrhage from the bowels in enteric fever occasionally coexists with other hæmorrhages, such as epistaxis, hæmoptysis, hæmatemesis, hæmaturia, bleeding from the gums, and purpura-spots, and then the disease has been designated 'hæmorrhagic putrid fever.'

The source of the hæmorrhage varies. When it occurs after the fourteenth day of the disease and is copious, it is probably due to a small artery having been laid open by one of the intestinal ulcers, or to a fungating condition of the undetached sloughs in the Peyerian glands. In one case, Jenner found that water injected into the superior mesenteric artery escaped freely from an ulcer in the ileum, and a similar observation was made by Hamernjk:^b but when the hæmorrhage occurs before the end of the second week, or is associated with hæmorrhages elsewhere, it is often due to rupture of the intestinal capillaries consequent on hyperæmia, or to a liquefied condition of the blood; and then, the quantity may be small. I have known slight intestinal hæmorrhage occur as early as the fifth or sixth day of the disease, ~~but~~ in several of my cases copious bleeding occurred so early that ulceration had probably not taken place (Diag. XVI.). Chomel also mentions

^b HAMERNJK, 1846, p. 40.

cases, where blood was found in the intestines before ulceration had commenced.¹

Different opinions have been expressed as to the importance of intestinal hæmorrhage, in reference to prognosis. Bretonneau, Chomel, Louis, Jenner, Bell,^j and most writers on fever have regarded it as a dangerous symptom. Six out of seven cases where it occurred under the care of Chomel proved fatal, and 3 out of 7 cases observed by Louis. On the other hand, Graves, in his Clinical Lectures,^k speaks of certain cases where the occurrence of hæmorrhage was thought to be productive of marked benefit. More recently, Trousseau has taught that it is a less dangerous symptom than is generally thought, and has stated that during seven years, he had only known three cases prove fatal;¹ he refers also to a memoir communicated to the French Academy by Ragaine, from which it appears that out of 115 cases of enteric fever hæmorrhage occurred in 11, all of which recovered. Dr. H. Kennedy, of Dublin, is likewise of opinion that most cases recover, and that the patients are frequently benefited by the occurrence.^m These statements have led some writers to regard intestinal hæmorrhage as a rather favourable symptom.ⁿ My experience is opposed to such a conclusion. When the hæmorrhage is scanty, it has probably little effect on the result; or, before the twelfth day, it may do good by relieving intestinal congestion. But when profuse (and after the twelfth day, even a slight bleeding is often but the precursor of one that is profuse), it is a formidable symptom. Although even then I have known many patients recover, I have never observed benefit from the occurrence, and I have repeatedly seen patients die unexpectedly by syncope a few hours after a copious bleeding, who had previously done well. Jenner,^o and Dr. Joseph Bell make a similar remark. Moreover, when the patient survives the effect of the bleeding, there is an unusual risk of his dying of peritonitis. The bleeding makes it probable that the ulceration has extended to the vessels beneath the transverse muscular fibres, and such ulceration is not unlikely to go on to perforation (Cases LXIV., LXXI.). Of my 60 cases 32 (53·33 per cent.) terminated fatally; in 11 of the 32 cases, the immediate cause of death was peritonitis; 14 of the remaining 21 cases died within three days of the bleeding, and 8 of the 14

¹ CHOMEL, 1834.

^j BELL, 1860, viii. 390.

^k 1848, vol. i. 266.

¹ TROUSSEAU, 1861.

^m KENNEDY, 1860, p. 226.

ⁿ *Med. Times and Gaz.* 1859, ii. 361, 441.

^o JENNER, 1853, p. 286.

within a few hours. Graves himself says that excessive hæmorrhage must be carefully watched and checked; and Trousseau records one case, where the patient died one hour after the commencement of the bleeding, which was so profuse as to saturate the entire bedding.

CASE LII. *Enteric Fever, with Constipated Bowels, fatal by Intestinal Hæmorrhage on 27th day.*

John D—, aged 24. adm. into Middlesex Hosp. under my care, March 10th, 1871, on 20th day of an attack of fever. Had been taken ill on Feb. 19th, and kept bed since 21st; symptoms had been severe headache and general pains, prostration, thirst, loss of appetite, nausea, and constipation. After admission temp. varied from $101^{\circ}8'$ to $104^{\circ}8'$ Fahr., and pulse from 98 to 128; no characteristic spots, but marked *taches cérébrales*; irregular perspirations; a dry brown tongue; no abdominal pain, distension, or gurgling; occasional retching of bilious fluid, but bowels acting only once in two or three days; motions rather loose and light-coloured; sleeplessness, followed by stupor, deafness, and subsultus; occasional epistaxis; congestion of lungs, and a considerable quantity of albumen in urine. On evening of March 15th (25th day) the patient had an ochrey motion, not very loose; temp. was 104° . During ensuing night he was very restless and delirious, and on following morning he passed a motion containing a considerable quantity of fluid red blood. Turpentine and acetate of lead were prescribed, and all this day there was no further action of bowels; temp. was only $102^{\circ}8'$, and pulse about 108. On following morning (March 27th) temp. had fallen to $100^{\circ}8'$, but pulse had risen to 128. Three dark motions had been passed in bed during night; bloody motions recurred three or four times in course of day, and temp. fell to below 100° . From 6 p.m. till death at 9 p.m. life was almost constantly discharging bright red blood from the bowel, and surface of body was blanched, cold, and clammy.

Autopsy.—Extensive disease of Peyer's patches, and of solitary glands in lower five or six feet of ileum. The hæmorrhage did not seem to have proceeded from one ulcer in particular, but to have been due to a fungating condition of the morbid material in many of Peyer's patches nearest to cæcum, corresponding to which were dark-red spongy excrescences firmly attached to the subjacent ulcerated surface. The spleen and mesenteric glands were enlarged. The kidneys together weighed 11 oz.; they were congested, but showed no sign of old disease.

f. Morbid Phenomena presented by the Urinary System.

1. *The Urine* has been carefully examined by many observers.^P The quantity during the first week or ten days is usually diminished. Sometimes it falls to one-half, to one-fourth, or

^P For an able abstract of much that has been written on the subject, the reader is referred to PARKES, *On the Urine*, 1860, p. 244; see also PARKES, 1855.

~~5~~ Urinologie de la Fièvre typhoïde - Roy Althaus
Robin Paris 1877 (Mues. Mus. Lib. ang.)

even to one-sixth of the normal standard, notwithstanding the increased amount of fluid ingesta. After the second week, the quantity increases, and I have frequently observed the urine to be copious, pale, and of low specific gravity, before the cessation of the fever. But in most cases the quantity does not increase greatly until convalescence, when the urine is almost invariably copious and of low specific gravity. At this period, I have repeatedly known as much as 80 or 90 fluid ounces passed in twenty-four hours.

The colour at first is darker than natural, and, according to Vogel, it is more intense than can be accounted for by mere concentration.^q Frequently in the advanced stages of the disease, and always in convalescence, the colour is unusually pale.

The acidity, during the first week or ten days, appears increased; but this is due to concentration of the urine; for, according to Parkes, when the exact amount of acid is determined by neutralizing with an alkali, it is found to be below the average by one-fifth, or one-fourth. During the third and fourth weeks, the urine is very feebly acid, and is often alkaline from decomposition of urea or from the presence of fixed alkali.

The specific gravity varies. At first, when the urine is scanty, it may be from 1025 to 1030. Parkes, in one instance, found it as high as 1038. In the advanced stages, and particularly in the typhoid state, the specific gravity falls, and in convalescence I have known it not to exceed 1005 or 1003.

The amount of urea excreted daily is increased. The researches of J. Vogel,^r A. Vogel,^s Moos,^t Brattler,^u Warnecke,^v Parkes,^w Handfield Jones,^x and others leave no doubt on the matter. Of 6 cases, where the urine was examined by myself and Dr. Sanderson at the Fever Hospital, the urea was increased at one period of the fever in all. The amount of increase varies. In most of Parkes's cases, the average increase was about one-fifth, *i.e.* the total quantity was about 480 grains, in place of 400. But occasionally this amount is far exceeded. Alfred Vogel once found as much as 78 grammes, or 1200 grains, passed in 24 hours; in one case Parkes found 57 grammes, or 880 grains; and in one of my cases the

^q NEUBAUER'S *Anleitung*, 2nd ed. p. 235.

^r *Ibid.* p. 248.

^s See note, page 15.

^t *Gaz. Méd. de Paris*, 1857, p. 193.

^u See PARKES, *loc. cit.*

^v WARNECKE, 1860.

^w *Op. cit.*

^x JONES, 1857, 1858 (1).

quantity was 62.5 grammes, or 964 grains. Moos, Brattler, and Warnecke have shown that urea is excreted in largest quantity during the first week of the disease, and that after this the quantity usually diminishes, this diminution being probably due to the state of inanition and the consequent reduction of tissue-metamorphosis. Still the quantity is usually in excess of the standard, as long as the fever lasts. In convalescence, it may be for several days much below the standard, the destructive metamorphosis of tissue being now checked, and the formative processes unusually active.

According to Brattler, there is a close correspondence between the amount of urea and the temperature, the greater the amount of urea, the higher the temperature. Although the temperature may be subject to variations according to the amount of evaporation from the skin and other circumstances, and the quantity of urea eliminated is not always an accurate index of the amount of destructive metamorphosis of the tissues (see page 116), yet it is found that the quantity of urea is usually greatest when the temperature is highest. Both are greatest in the first week, and afterwards gradually diminish. An increased amount of urea, however, is not always constant throughout the fever. There are certain incidental circumstances which may lead to its diminution, even below the standard of health; and this may account for the fact that some observers have thought that the quantity of urea in enteric fever is really diminished. It is possible that the quantity may be reduced, owing to the occurrence of some local inflammation. For example, in one case Dr Parkes ascertained that the amount of urea during an intercurrent attack of pleurisy was one-third less than the average amount before the pleurisy. Dr. Parkes, however, has shown that the amount of urea is not influenced by the diarrhoea; and hence the intestines cannot be regarded as a channel for eliminating urea in enteric fever. Again, an increased amount of urea may be formed in the system, but may accumulate in the blood, instead of being excreted by the urine. The cause of this non-elimination is not always apparent; but in many instances it is due to an altered condition of the secreting tissue of the kidneys, as shown by the presence of albumen and tube-casts in the urine. The consequences of non-elimination appear to be the same as in Typhus and Relapsing Fever, viz.: delirium, stupor, coma, convulsions, and other symptoms of the

typhoid state.⁷ Reabsorption of urea consequent on retention of urine may lead to the same results as non-elimination.

Louis proved to demonstration,⁸ and all pathologists now admit, that the cerebral symptoms of enteric fever are independent of inflammation of the brain, or its membranes. Many recent writers have referred them to *septicæmia*, produced by the absorption of pus, or putrid matter, from the intestinal ulcers.⁹ Although such an absorption is very probable, it is to be observed that there is no relation between the presence and severity of cerebral symptoms and the extent of the intestinal disease, and that severe cerebral symptoms and even the typhoid state may occur before ulceration has commenced, while all of these symptoms differ in no way from those which are common in the course of other diseases, where there is no ulcerated surface from which pus can be absorbed. The phenomena of the typhoid state are probably due, as in other diseases (see pp. 20 and 181), to the retention in the system of the products of metamorphosis which ought to be eliminated by the kidneys. In several instances I have found that the quantity of urea excreted in twenty-four hours diminished on the advent of cerebral symptoms, and increased again on their cessation. In one case the quantity, which was 292 grains when the patient was delirious and unconscious, rose to 964 grains when the delirium abated and the consciousness returned. In another, the quantity, which at first was 422 grains, fell to 352 grains on the appearance of delirium and stupor, and rose to 490 grains when these symptoms ceased. (See Cases XLVI. and L.)

The *Uric Acid* is always increased, and may be three times the normal standard. Thus the normal daily amount for an adult male being 7.72 grains (J. Vogel), Dr. Handfield Jones found as much as 23.76 grains excreted by a man aged 24, on the seventeenth day of the fever.^b According to Zimmermann,^c the quantity increases up to the fourteenth day, and then diminishes. As in typhus, deposits of lithates may occur at any stage of enteric fever, and are not necessarily critical. During convalescence, the excretion of uric acid, like that of urea, is usually for some days below the normal standard.

⁷ PARKES, *On Urine*, 1860, p. 252.

⁸ LOUIS, 1841, ii. 22.

⁹ Piorry applied to enteric fever the designation *Entérite septicémique*. See also TODD, 1860, p. 113; GAIRDNER, 1862 (2), p. 200.

^b JONES, 1857.

^c ZIMMERMANN, 1852.

Chloride of Sodium, of which about three drachms is passed in the urine daily by the healthy adult, is diminished sometimes to a mere trace. This diminution may be partly due, as suggested by Vogel, to the small quantity taken with the food, and partly to the large amount of chloride of sodium passed with the stools. Parkes, however, has noticed a great diminution occur, without any change of diet, in cases where there was no diarrhoea or pneumonia, so that, as in typhus, there appears to be an absolute retention of chlorides in the system (see page 154). During convalescence the chlorides are passed in abundance.

Albumen is less frequently present in the urine than in typhus, and when it occurs it appears *later* in the disease. Some years ago I examined the urine daily in 25 cases, and found albumen only in 5. Parkes found albumen in 7 of 21 cases; Brattler, in 9 of 23 cases; Martin Solon,^a in 21 of 54 cases; Becquerel, in 8 of 38 cases;^e Finger, in 29 of 88 cases;^f Friedrich, in 14 out of 33 cases;^g Abeille, in 12 of 95 cases; Smoler, in 24 of 100 cases;^h and Bäumlér, in 28 of 72 cases.ⁱ Adding together these results, albumen was discovered in 157 out of 549 cases; or in 28.6 per cent. Griesinger found albumen in about one-third of his cases. The quantity of albumen is usually small, and its duration temporary. The albumen rarely appears before the middle of the third week. In none of my cases was it present before the sixteenth day. In all of Finger's cases, it appeared between the sixteenth and twenty-fifth days. Its appearance coincides with the time that cerebral symptoms usually supervene; and in this respect its later occurrence than in typhus is a fact of no small interest. (See page 155).

Cases of enteric fever with much or persistent albuminuria are usually severe, and have the typhoid state well-developed. Of 50 cases observed by Finger and Martin Solon, 27 died. Kerchensteiner also found albumen chiefly in severe cases. In fatal cases I have found the kidneys congested, the cortices hypertrophied, and the uriniferous tubes gorged with granular epithelium. The remarks made at page 156, with regard to

^a SOLON, 1847.

^e *Brit. and For. Med. Chir. Rev.* April 1852, p. 316.

^f *Prag, Vierteljahrshsch.* 1847, iii. 28.

^g SCHMIDT'S *Jahrb.* 1855, Bd. 86, s. 172.

^h SCHMIDT, *Op. cit.* 1868, Bd. 131, s. 44.

ⁱ BÄUMLER, 1866.

^j GRIESINGER, 1864. Some observers seem to have found albuminuria more frequently. Trotter found it in all of 20 cases (TROTTER, 1854.)

the occurrence of albuminuria in typhus, are equally applicable here.

Epithelium, Blood, etc. Renal epithelium and tube-casts may, or may not, coexist with albumen in the urine. Zimmermann says that tube-casts may be found, even when there is no albumen. In severe cases I have sometimes found the urine to contain blood, and in several instances I have met with copious hæmaturia, for the most part in conjunction with other hæmorrhages.

Leucine and Tyrosine have been found occasionally in the urine by Frerichs under the same circumstances as in typhus. (See pp. 157, 210). Griesinger found them in 11 of 26 patients. He also detected traces of *Kreatinine* in every one of 31 cases.

Phosphates. In the advanced stages, when the urine is but feebly acid, I have often found it to deposit a large amount of earthy, and triple phosphates.

Sugar. The urine rarely contains traces of sugar. Griesinger failed to find it in one of 27 patients.^k

2. *Retention and Incontinence of Urine* (see *Symptoms under Nervous System.*)

g. *Symptoms referable to the Nervous and Muscular Systems.*

1. *Headache*, as in typhus, is one of the first and most constant symptoms. I ascertained that it existed in 77 out of 82 cases; and Louis noted it in all but 7 of 133 cases.^l It is probably as common in children as in adults.

Of 126 cases where Louis noted its date of commencement, it existed from the first in 112; and in all the remaining 14 it commenced on or before the sixth day. It is most severe during the first week; and by the end of the second week or before the commencement of delirium, it has usually ceased. It is usually confined to the forehead; at other times, it extends over the entire head. It is not usually very intense. In 15 of 67 cases, I have noted it as severe. Even when severe, it is rarely described as of a shooting, or bursting character: it is more commonly dull and heavy.

2. *Vertigo* is often present from the first, and it may persist throughout the disease. It was complained of by 36 out of 55 patients whom I questioned on the point.

3. *Pains in the Back and Limbs*, of an aching or indefinable character, are rarely absent from the commencement. They

^k GRIESINGER, 1864, p. 221.

^l LOUIS, 1841, ii. 1.

are most severe in the lower extremities. The pain in the back is usually slight, but in rare cases there is true rhachialgia—cervical or dorsal.^m In several instances I have known the pains in the limbs assume a neuralgic character, and prevent sleep; while in others they are articular, and the case at first simulates rheumatism.

4. *Impairment of the Mental Faculties. Delirium.* Enteric fever contrasts strongly with typhus, in the circumstance that a large proportion of the patients pass through the attack without any delirium or impairment of the mental faculties. Of 100 cases, I ascertained that the intelligence remained perfectly clear throughout the attack in 33; a few of these may have talked or moaned a little in their sleep, but when awake they appeared as rational as in health. Moreover, 3 of the 33 patients died; 2, from perforation of the bowel, and 1, from epistaxis. Louis appears to have made a similar observation, for in 32 out of 134 of his cases there was neither somnolence nor delirium; 8 also of his cases in which there was no delirium were fatal, 6 of them from perforation.ⁿ In 2 of Jenner's 23 fatal cases there was no delirium nor mental confusion.^o

In 67 of 100 cases, I ascertained that there was either delirium or mental confusion; but in many of these cases the delirium was only slight and occasional, it occurred chiefly in the night-time, and the patient was at most times quite rational. Of the 67 cases, 18 were fatal. In only 22 cases, of which 11 were fatal, was there at any time complete unconsciousness.

The character of the delirium varies as in typhus (see page 160). At first it is often active and noisy, the patient screaming and shouting, and being with difficulty kept in bed. In this state the patient may jump out of a window, or do himself some other bodily harm. As he becomes more prostrate, this active delirium may pass into the forms of typhomania or delirium tremens described under the head of typhus. The more active and noisy the delirium, the greater is the danger. Of 17 cases in which Louis noted active delirium, 12 died; and of 18 of my cases where it occurred, 9 were fatal. My observations confirm those of Sir W. Jenner to the effect that this form of delirium is more common than in typhus, although the fact is probably in part accounted for by the circumstance that the

^m FRITZ, 1864, p. 58.

ⁿ LOUIS, 1841, ii. 18.

^o JENNER, 1849 (2).

See also Shendak. Land. Med. Rec
Nov. 14. 1873

patients are usually younger and more robust before the attack than in typhus. (See page 161).

The delirium is later in making its appearance than in typhus. As a rule, it does not commence until the middle or end of the second week; and it often does not appear until the end of the third week, and then it only lasts for a few days before death or recovery. Still, there are exceptional cases where the delirium occurs earlier. Louis mentions two instances where the patients were delirious during the first night.^p Jenner observes, that active delirium is occasionally one of the earliest symptoms, and may then cease on the appearance of the eruption. Bristowe has recorded a case where maniacal delirium occurred on the second day.^r

Many years ago I noted delirium as occurring during the first week in 9 out of 100 cases; and since then I have met with a considerable number of instances in which acute delirium was the earliest symptom observed. (Case LIII.) In three of these cases in which I was consulted, the illness had at first been regarded as acute mania, and in two of the cases removal of the patient to a lunatic asylum had been contemplated. M. Motet has recorded a case of this sort, in which the patient was actually removed to an asylum before the real nature of the malady was discovered.^s The delirium which now and then occurs in convalescence will be referred to hereafter.

CASE LIII. *Enteric Fever. Sudden acute Delirium on 5th day mistaken for Mania.*

In the autumn of 1870, I was consulted in the case of a German gentleman, aged 40, who had been much excited by the Franco-Prussian war, and who, after four days of slight malaise, which had attracted little notice, passed suddenly into a state of acute maniacal delirium, requiring two men to hold him down in bed, and absolutely refused all food. He was thought to be suffering from an attack of insanity; but with these symptoms there was pyrexia; pulse quick, temp. 102°; dry tongue; and diarrhoea, but no spots. Half a drachm of hydrate of chloral was ordered every two hours. After the third dose, he slept well, and next day he was quiet and much better in every way; but the fever ran its usual course.

The delirium is almost invariably greatest in the night-time, and sometimes it occurs only in the night.

The delusions under which the patient labours are similar to those of typhus (p. 162). When the delirium is active, the

^p LOUIS, 1841, ii. 32.

^r *Trans. Path. Soc.* January 7, 1862.

^q JENNER, 1853, p. 234.

^s *Archiv. Gén. de Méd.* 1868, xi. 504.

mind appears to wander from one subject to another; but in the quieter forms, it is usually centred on some fixed object. Chomel mentions a case where the patient continually demanded to be bled.* One of Louis's patients could not be persuaded that he had not been robbed; another insisted that during his illness he had been to his native village, and had brought back some wolf's cubs, which he wanted to sell. In one of my cases the patient's ideas fluctuated between money and his mother; and in another, the patient always burst out laughing when spoken to. Some patients, in the midst of the most dangerous symptoms, insist that there is nothing the matter with them, a form of delirium which, in Louis's experience, always terminated fatally.

In children, delirium presents much the same characters as in adults. Taupin noted acute delirium in 44 out of 118 cases. Rilliet only observed delirium in one-third of his cases." It commences, on the whole, rather earlier than in adults, but rarely before the second week.

5. *Wakefulness, Somnolence, and Coma.* During the first week or ten days of the disease, the patient is often wakeful at night, and the sleep is much disturbed. I have noted these symptoms in 76 out of 100 cases. On the whole, however, the wakefulness is less complete than it usually is in the early stage of typhus.

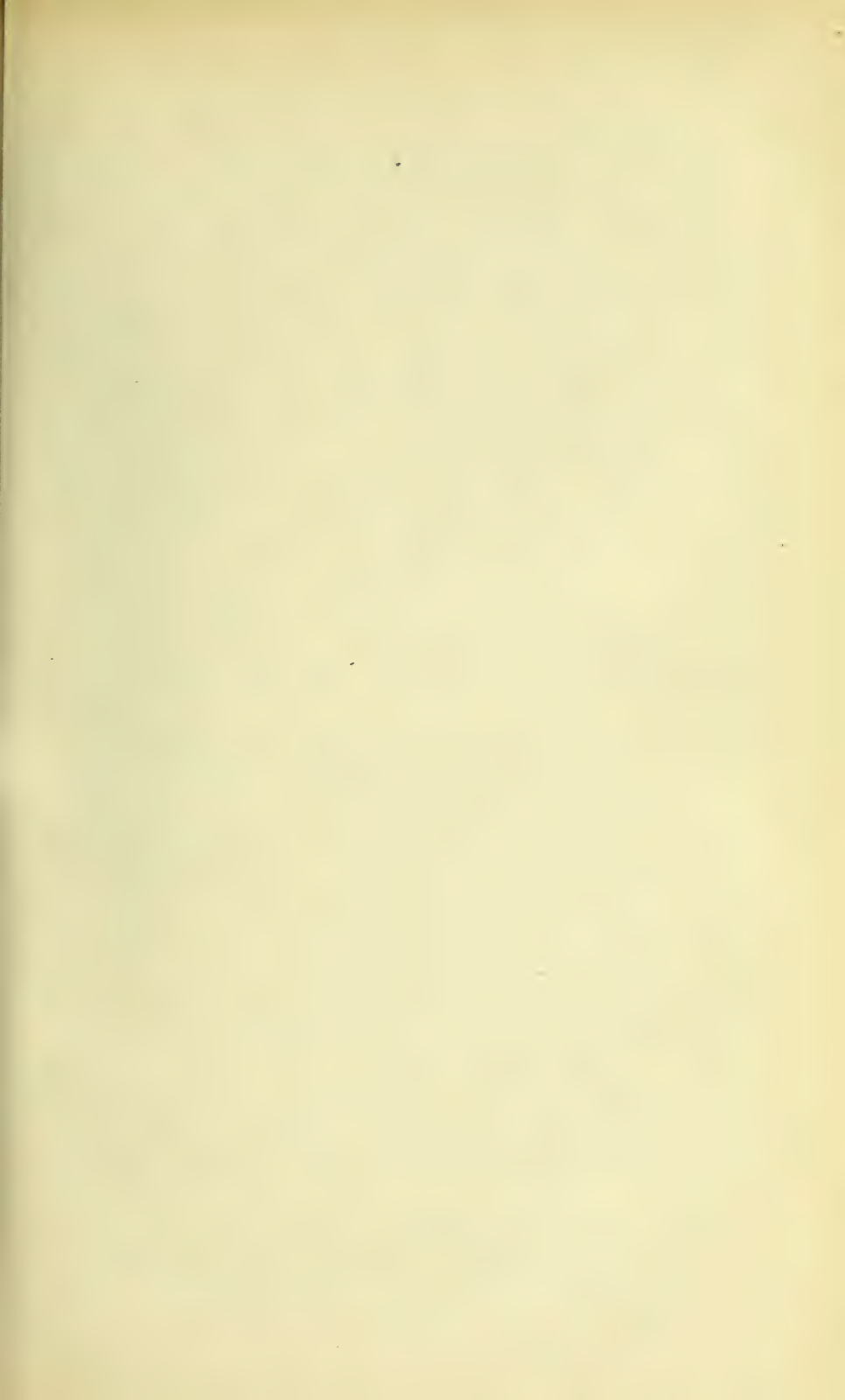
But in many cases, about the end of the second week a certain amount of somnolence supervenes. This I have noted in 57 out of 100 cases. Louis observed somnolence in 102 out of 134 cases: of his 46 fatal cases it was absent only in 5. In severe cases somnolence is sometimes observed at an early stage. Of Louis's 46 fatal cases, it was observed on the first day in 4, and during the first week in 5 others; whereas of 88 cases which recovered, it was observed during the first week in only 2.^v

At first the somnolence is slight and the patient is easily roused; but in severe cases it gradually becomes more profound. Complete unconsciousness, however, is rarer than in typhus; it occurred in 22 of my 100 cases. Occasionally, the patient lies for several days perfectly still and quiet, and appears to understand everything that is said and done, but is unable to articulate intelligible replies. The dilated pupils, half-closed eyes, and languid, apathetic, rather than stupid,

* CHOMEL, 1834.

" LOUIS, 1841, ii. 35.

^v Ibid. p. 6.



countenance, accompanying this condition, might cause the case to be mistaken for hysteric coma. Dr. W. T. Gairdner has called attention to this condition;^w and I have met with many cases answering more or less to his description. In one instance, where the patient had been in this state for upwards of a week, although occasionally delirious, she bade adieu to her friends an hour before her death, apparently quite aware of her approaching end. I have never observed any state approaching to this in typhus.

The somnolence is often interrupted by delirium. During the night the patient is wakeful and delirious, and in the day-time stupid and drowsy; but in severe cases the somnolence gradually becomes more constant, and lasts until death or the commencement of convalescence. More or less somnolence in most cases precedes delirium;^x whereas in typhus the patient is usually wakeful and delirious before he becomes drowsy.

True coma-vigil (see page 165) rarely occurs in enteric fever.

Somnolence follows the same rule in children as in adults. West has known it so overwhelming at the outset of the disease, that the child fell asleep two or three times during breakfast.^y

6. *Prostration*. In all cases of enteric fever, there is muscular prostration from the first, which increases with the progress of the disease; but, as a rule, the degree of prostration is much less than in typhus. A large proportion of patients (44 out of 100 of my cases) are able to sit up, and get up to stool, throughout the attack; and I have repeatedly known persons who had the disease in a mild form attend from first to last as out-patients at a hospital. Even in fatal cases there may be comparatively little prostration, up to the time of death. I have often, ~~known~~ patients get up to stool within twenty-four hours of the fatal event; and one of my patients, who walked two or three miles to hospital, died thirty-six hours after admission. Louis mentions similar cases;^z and Jenner says that in two of his 23 fatal cases, the patients were able to leave their beds unassisted and with facility throughout the disease.^a Complete prostration (which

^w GAIRDNER, 1862 (2), 144.

^x 'Le délire *débutait*, chez presque tous les sujets, après la somnolence' (LOUIS, 1841, ii. 20).

^y WEST, 1848, ed. 1854, p. 558.

^z LOUIS, 1841, ii. 67.

^a JENNER, 1849 (2).

occurred in about one-third of my cases) appears later than in typhus; it is rare before the middle of the third week. Out of 62 patients, I ascertained that only 7 kept their bed from the first; while 21, or more than one-third, did not take to bed until after the first week; and 6 continued going about until the third week. Again, of 600 patients under my care in the Fever Hospital, only 140 (23·33 per cent.) had been ill not more than seven days, and only 22 (3·66 per cent.) not more than four days; whereas 141 (23·5 per cent.) had been ill over fourteen days before admission. The average duration before admission of the 600 cases was 10·78 days. (Compare with typhus, page 166).

7. *The Decubitus*, as in typhus, is usually dorsal. (See p. 166).

8. *Muscular Paralysis*. The stools and urine are passed involuntarily in most cases where there is complete prostration; but, on the whole, these phenomena are rarer than in typhus. I noted them in only 21 of 100 cases; retention of urine requiring the catheter existed in only 2 cases. Involuntary evacuations were noted by Jenner in only 10 of 23 fatal cases, and retention of urine only once. (See page 167). Inability to protrude the tongue may be observed in grave cases; and dysphagia is not uncommon shortly before a fatal termination. Other forms of paralysis will be alluded to under the head of 'Complications.'

9. *Muscular Agitation*. Tremors of the hands or tongue, or quivering of the lips, I have noted in 27 out of 100 cases; 8 of the 27 cases were fatal, and 13 of the remaining 73 cases. In 11 cases, of which 6 were fatal, the tremulousness was very marked. These tremors may occur in young persons who have never been addicted to spirits (see page 167). They are also sometimes observed in cases where there is no delirium, and where the intelligence is perfectly clear. Severe tremors, unaccompanied by much mental disturbance, often accompany deep ulceration and sloughing of Peyer's patches.

Spasmodic movements, such as subsultus, twitchings of the mouth, carphology, and protracted hiccup, are only observed in the advanced stage of severe cases. I noted them in 11 of 100 cases; 8 of the 11 cases, but only 13 of the remaining 89 cases, were fatal. In one case, subsultus lasted for five days before the fatal event. Louis observed these symptoms in 18 out of 134 cases; 12 of the 18 cases were fatal, but only 34 of

the remaining 116 cases.^b Jenner noted subsultus in 6, and carphology in 2, out of 21 fatal cases.^c

In children these symptoms are less frequent, but they are of equally grave signification. Barthez and Rilliet noted carphology 7 times, and subsultus 4 times (probably in the same cases) out of 107 cases.^d They also allude to 2 cases where choreic movements occurred in the course of the fever, and to another case where chorea occurred during convalescence and proved fatal. According to West, 'even when the disease is severe, neither subsultus nor floccitation is frequent.'^e It is difficult to understand M. Taupin's statement, that carphology occurs 'dans presque tous les cas,' and that he observed subsultus in 79 out of 121 cases, except on the supposition that he attached a different meaning to these terms from other writers. In most severe cases, however, children pick their nose or lips until they bleed.

10. *Muscular Rigidity.* Rigid contraction of the muscles of the trunk, neck, or extremities is met with in some severe cases. More than once I have known the head so rigidly retracted, that deglutition and breathing were impeded; and similar cases, which are not necessarily fatal, have been recorded by Fritz^f and Ogle.^g At other times the patient is unable to swallow from spasmodic constriction of the pharynx, or there is strabismus,^h or trismus, or spasm of the glottis simulating laryngitis.

Rigid contraction of the muscles of the extremities, or of the neck, was observed by Louis in 4 out of 134 cases; and rigidity of the trunk by Rilliet and Barthez, in 5 out of 107 children: all 9 cases were fatal. Chomel,ⁱ Barth,^j and Jackson,^k however, each record one example, where the patient recovered. Barth also observed a case of cataleptic rigidity which recovered; and several similar cases, all females, have occurred in my own practice.

11. *General Convulsions* are much rarer than in typhus, and appear to be less frequently uræmic. Of 2,960 cases of enteric fever admitted into the Fever Hospital in 8 years (1862-9), convulsions occurred in only 6, or once in 493 cases. (Com-

^b LOUIS, 1841, ii. 44.

^d BARTHEZ and RILLIET, 1853, ii. 681, 717.

^f FRITZ, 1864, p. 27.

^c JENNER, 1849 (2).

^e WEST, 1848, ed. 1854, p. 560.

^g *Med. Times and Gaz.* January 1865.

^h I have noted strabismus in several instances, and a case in which there was convergent strabismus of both eyes is recorded by Trousseau (*Clin. Med.* Syd. Soc. Trans. ii. 353.)

ⁱ CHOMEL, 1834.

^j LOUIS, 1841, ii. 63.

^k BARTLETT, 1856, p. 54.

pare with p. 168). Six cases have occurred in my own practice. In one, convulsions came on after much delirium on the sixteenth day, and the patient died comatose half an hour afterwards; the urine was albuminous; the cortical substance of the kidneys was found to be much hypertrophied and pale; and the renal epithelium was loaded with oil, so that the disease was probably of some standing. The second patient was a boy aged 13, who died suddenly in convulsions, on the thirtieth day of illness, several days after convalescence had apparently commenced; the urine was not examined and there was no *post-mortem* examination. In the third case, general convulsions, with foaming at the mouth and biting of the tongue, occurred as early as the eleventh day; the fit was preceded by acute delirium and followed by much drowsiness, but the patient ultimately recovered: the urine on the day of the convulsions did not exceed 12 ounces, and its specific gravity was 1012; but it contained no albumen. In the fourth instance, a patient recovered after a severe fit of convulsions, which occurred on the fourteenth day and lasted for a quarter of an hour; for several days before there had been great restlessness and delirium, but the fit was immediately preceded and followed by stupor; the urine was not examined. The fifth patient was a man aged 23, who, after several days of tremors and choreic twitchings of the limbs and eyelids, had on the twelfth day of illness two severe epileptiform fits with foaming at the mouth; the urine contained no albumen, and the patient recovered; he had not been subject to epilepsy. The last patient was a gentleman, about 50 years of age; while convalescing from a relapse of enteric fever, his entire illness having lasted upwards of ten weeks, he had four epileptiform attacks in which he bit his tongue; there was no albumen in the urine, but the heart's action was weak, and there was thrombosis of the left femoral vein. He made a good recovery.

Barthez and Rilliet mention 5 instances of convulsions occurring in children; 4 of the 5 died; the condition of the urine and kidneys is not stated.¹ According to West, convulsions followed by coma constitute not an uncommon mode of fatal termination in children.^m

h. Morbid Phenomena presented by the Organs of Special Sense.

1. *Organs of Vision.* Increased vascularity of the conjunctivæ is comparatively rare; and, when it occurs, it is much later in

¹ BARTHEZ and RILLIET, 1853, ii. 682.

^m WEST, 1848, ed. 1854, p. 561.





appearing than in typhus, and the blood in the conjunctival vessels is of a brighter hue. I have noted great vascularity of the conjunctivæ in 8 out of 100 cases, and pain in the eyes without increased vascularity, twice. On the other hand, Louis noted increased vascularity in 38 out of 60 cases, and tenderness without vascularity, seven times;ⁿ but of 13 fatal cases observed by Jenner, the conjunctivæ were pale in 10, and injected in only 3.^o Bartlett also observes that congestion of the conjunctivæ is rare.^p (See p. 177).

In 6 out of 100 cases I have known the eyelids kept closed in the advanced stages, as if from intolerance of light: 3 of the 6 died. Louis says, that in 4 fatal cases he had known the eyelids so firmly closed that it was difficult to force them open; and that he had never known a patient presenting this symptom recover. He was inclined to regard it as of a purely spasmodic character, analogous to the permanent rigidity occasionally observed in the arms and neck. In one instance, this firm contraction of the eyelids lasted for upwards of a fortnight.^q

Sir W. Jenner was the first to point out the dilated condition of the pupil in enteric fever, as contrasted with the small pupil of typhus. Of 23 fatal cases, he observed the pupils dilated in 7, and contracted in 2.^r In fully three-fourths of my cases, the pupils were abnormally dilated, at some stage of the fever, and Dr. W. T. Gairdner has made similar observations at Edinburgh.^s Dilatation of the pupil may be observed after the tenth day in cases where there is no delirium or impairment of the mental faculties, or it may coexist with delirium, and especially with that condition approaching to hysteric coma, already described (see p. 537). In cases, however, where there is great stupor and complete unconsciousness, the pupils are often contracted, and I have then often known them to be as contracted as in any case of typhus (see p. 177.) The difference between typhus and enteric fever as regards the size of the pupil is in keeping with the differences in vascularity; a small pupil is associated with hyperæmia, and a dilated pupil with anæmia, of the eye.

Some patients complain of haziness of vision, increased by sitting up. In very rare cases, strabismus is observed; and in at least 6 cases I have known inequality of the pupils supervene during the attack. I have notes of two such cases

ⁿ LOUIS, 1841, ii. 87.

^q LOUIS, 1841, ii. 88.

^o JENNER, 1849 (2).

^r JENNER, 1849 (2).

^p BARTLETT, 1856, p. 53.

^s GAIRDNER, 1862 (2), 148.

in which there was a *post-mortem* examination; in both there were the intestinal lesions of enteric fever, and in neither could any tubercle or other lesion within the cranium be found to account for the state of the pupils.

2. *Organs of Hearing.* Ringing and buzzing sounds in the ears are often complained of in the early stage of the disease. Louis noted them in 36 out of 99 cases, and Barth in 85 out of 129 cases.[†] According to Louis, they are more severe and last longer in the severe cases, than in the mild.

Deafness of one or both ears is a common symptom. I noted it in 20 out of 46 cases; Louis observed it in 58 of 99 cases; Barth, in 36 of 129 cases; and Jenner, in 6 of 23 fatal cases. It is rarely observed before the end of the second week. As Louis observes, 'La plus extrême surdité n'ajoute rien à la gravité du pronostic.' Trousseau draws a distinction between deafness of one, or of both ears; deafness of one ear he thinks unfavourable, as it is apt to arise from suppuration of the ear, which may excite meningitis; on the other hand, he asserts that he has scarcely ever known a patient die after having deafness of both ears, which he attributes to catarrh of the Eustachian tubes.[‡] My experience does not lead me to regard deafness in quite so favourable a light, and probably the remarks made at p. 177 are equally applicable here.

3. *Cutaneous Sensibility.* Hyperæsthesia of the integuments has occurred in about 5 per cent. of the patients under my care.[§] It is most common in children and females, and is not a formidable symptom. It may occur in the first week of the disease or not until convalescence. It is chiefly observed in the abdomen and lower extremities, and it always follows an ascending course, its upper margin being tolerably well defined and the whole body below this being affected. The slightest touch over the affected part makes the patient cry out, and there is also in most cases tenderness over the spines of the cervical or dorsal vertebræ. The abdominal tenderness from this cause must not be confounded with that due to peritonitis. On the other hand, Rilliet and Barthez speak of anæsthesia as an occasional grave symptom in children.

4. *Epistaxis* is a common symptom, but appears to be more frequent in Paris than elsewhere. Thus, while Louis and Barth found it in 91 of 156 cases,^{||} Dr. Flint noticed it in only 21 of 73 cases in America; [¶] Jenner, in 5 of 15 fatal cases; and

[†] LOUIS, 1841, ii. 93. [‡] TROUSSEAU, 1861, p. 170. [§] See also FRITZ, 1864, p. 27.

^{||} LOUIS, 1841, ii. 84.

[¶] FLINT, 1852.

it occurred in only 13 of 58 cases noted by myself. As to children, Rilliet and Barthez speak of epistaxis as occurring in one-fifth of their 107 cases,⁷ and Taupin observed it in only 3 of 121 cases.²

The hæmorrhage may take place at any period of the fever, and may recur repeatedly. The quantity of blood lost may vary from a few drops to several pounds. All observers agree in stating that the bleeding is never followed by any relief to the symptoms; while, on the other hand, it may be so profuse, as to be the immediate cause of death. Several examples of death from epistaxis have come under my notice.

CASE LIV. *Enteric Fever. Death on 10th day from Epistaxis. Autopsy: Enlargement of Spleen and Mesenteric Glands. Commencing Ulceration of Peyer's Patches.*

Mary F—, aged 20, a servant in a gentleman's family, adm. into L. F. Hosp. on *July 29th*, 1857. Was taken ill on 22nd at Ramsgate, where she had been on a visit for three weeks. Her symptoms before admission had been cold shivers, headache, pains in limbs, urgent diarrhoea, and prostration.

July 30th (8th day). Pulse 120. Slept well; is free from pain, and intelligence clear. Skin hot and dry; circumscribed flush on both cheeks; one or two lenticular spots; tongue furred and red at edges; abdomen tympanitic; gurgling, but no tenderness, in right iliac fossa; three watery stools. Was ordered beef-tea and milk, a starch and opium enema, and a mixture containing acetate of lead (gr.ij.) and liq. morph. acet. (m.v.) after each motion. *Aug. 1st (10th day).* No worse until 9 p.m., when she began to bleed from nose very profusely. When seen about an hour after, pulse was almost imperceptible, skin cold, and features pinched. Four stools, but no blood in any of them. Cold was applied to forehead, and 10 grains of gallic acid, with 20 minims of sulphuric acid, were ordered every hour. Bleeding, however, continued, and patient died at 11.40 p.m., before plugging could be resorted to.

Autopsy, 31 hours after death.—Cadaveric rigidity well-marked. All internal organs very pale and anæmic; old adhesions over left lung. Liver 34 ounces, very pale. A little pale, thin bile in gall-bladder. Spleen 9 ounces; very soft. Mesenteric glands much enlarged, one or two almost as large as walnuts; surface on section much injected. Stomach and upper part of small intestines contained several ounces of partly coagulated dark blood, but mucous membrane of this portion of digestive canal was healthy. No blood in lower portion of bowel. About a yard above cæcum, Peyer's patches began to be diseased. The number and extent of diseased patches increased

⁷ BARTHEZ and RILLIET, 1853, ii. 685.

² TAUPIN, 1839.

towards cæcum; many of patches were elevated fully one-eighth of an inch above surface, and contained a cheesy, yellow deposit; mucous membrane over most of them was intact, but on one or two, close to ileo-colic valve, there was slight ulceration; membrane between patches was intensely injected. Solitary glands in cæcum, ascending colon, and lower part of ileum likewise elevated, and contained a cheesy deposit.

i. Emaciation.

In cases of enteric fever protracted to three or four weeks there is usually great, and often extreme, emaciation. The difference from typhus in this respect is very remarkable. (See p. 248.)

SECTION VII.—STAGES AND DURATION.—RELAPSES.

a. Stages.

Although any sub-division of enteric fever into distinct stages must be artificial, it may be well to consider the disease under the following stages: 1, the stage of incubation; 2, the stage of invasion; 3, the stage of glandular enlargement; 4, the stage of ulceration or sloughing; 5, the stage of lysis; and 6, convalescence.

1. *The stage of Incubation* is considered at page 467.

2. *The stage of Invasion* lasts for one or more days, and extends from the first feeling of illness until the development of decided febrile symptoms. The invasion is often so gradual, that neither the patient nor his friends can state the precise day on which the illness commenced. This has been the case with more than one-half of the patients under my care. Jenner could only ascertain the day of commencement in 7 of 15 fatal cases.^a Louis and Chomel^b speak of the invasion as being in most cases sudden: but the experience of Forget, as well as of Bartlett and other American writers, confirms that of Jenner and myself. At all events, the contrast which enteric fever presents in this respect to typhus and relapsing fever is remarkable. (See pp. 179, and 375.)

Of 63 cases, where I noted the mode of commencement some years ago, pains in the head and limbs, commonly aching, but sometimes neuralgic, were among the earliest symptoms in 56, and most of these patients also suffered from irregular chills, languor and giddiness; in only 3 cases did the disease

^a JENNER, 1849 (2).

^b LOUIS, 1841, i. 419; CHOMEL, 1834.

commence with anything approaching to rigors, but in several instances not included in this analysis I have observed decided rigors, and in fact all the phenomena of ague, during the first few days. In 12 cases there was great nausea and vomiting; in 5, considerable pain in the abdomen; and in 26, or 41 per cent., diarrhœa. In several of these last cases, the patients had been suffering for a week or two from ordinary autumnal diarrhœa, before any symptom of fever appeared. Very often the patient is at first thought to be suffering merely from an ordinary bilious attack. Boils and abscesses have been sometimes noted among the earliest symptoms. But the one symptom which is never absent from the first is an elevation of temperature.

3. *The Stage of Glandular Enlargement* extends from the commencement of fever until about the twelfth or fourteenth day. Some of the intestinal glands probably continue to enlarge after ulceration has commenced in others. Strictly speaking, this stage includes the stage of invasion. It is characterized by a fever of a remittent type (the evening exacerbation reaching its acme about the fourth or sixth day), vertigo, headache and general pains, disturbed sleep, daily increasing prostration, copious excretion of urea, furred tongue with red edges and tip, diarrhœa, occasional vomiting and epistaxis, and the appearance of the eruption. Sometimes there are no abdominal symptoms, and in rare cases there may be acute delirium, or bronchitis with great pulmonary engorgement, which may terminate fatally. Death, however, rarely occurs during this stage, and very often the patient continues to go about.

4. *The Stage of Ulceration or Sloughing* extends from about the twelfth or fourteenth day to some time between the twenty-first and twenty-eighth day. This stage is characterized by a persistence of fever with less decided remissions; successive crops of eruption; tongue more or less dry and often red, glazed, and fissured; distended abdomen; diarrhœa, often with membranous flakes or blood in the stools; retention of urea; delirium, and other phenomena of the typhoid state. The duration of this stage is variable. It may be protracted by pulmonary, abdominal, and other complications, but independently of any such cause it may be carried on to the end of the fourth, or even into the fifth, week, and for a time there may be what Wunderlich has designated the *amphibolic stage*—a period of uncertainty, or of changing fortunes. After decided

remissions or even a condition approaching to collapse, there may be one or more *recrudescences* of fever lasting for several days. These must be distinguished from true relapses which supervene after a decided intermission of pyrexia and apparent convalescence; at all events, when death occurs after recrudescences we do not as a rule find evidence of recent disease in the intestinal glands, as in fatal cases of relapse.

5. *Stage of Lysis.* The termination of enteric fever, like its commencement, is gradual, and is not marked by any critical evacuation. Resolution takes place by *lysis*, and not by *crisis*. At first the morning remissions become more decided, and then the evening remissions less severe. Simultaneously with these changes, the tongue becomes cleaner and moister; the cerebral symptoms abate; and fresh lenticular spots cease to appear. When the intestinal lesion does not go on to ulceration, the stage of lysis may commence as early as the end of the second week of the disease; and then during the third week the pyrexia may be essentially of an intermittent type, the pulse and temperature being normal in the morning, but the latter rising two or more degrees towards evening. More commonly lysis does not begin until some time during the fourth week, and then it may last from two or three days to a week, and is liable to be interrupted by complications.

6. *Convalescence* can only be said to be fairly established when the temperature is normal on two successive evenings. It is also liable to be interrupted by relapses, peritonitis, the development of tubercle, and other dangerous sequelæ; and irrespectively of such mishaps, it is always slow in cases which have run the ordinary course of three or four weeks, and where consequently there has been considerable emaciation. Although the temperature keeps low, the pulse may be quicker than during the fever, and the patient is slow in regaining his appetite and strength. In all these respects enteric fever contrasts strongly with typhus.

b. Duration.

The ordinary duration of enteric fever is from three to four weeks. Of 200 cases which recovered, and in which I was able to fix the commencement with tolerable certainty, the duration was: 10 to 14 days in 7 cases; 15 to 21 days in 49; 22 to 28 days in 111; and 29 to 35 days in 33. Thus, in all but 7 cases the duration exceeded two weeks; in nearly three-fourths of the total number it exceeded three weeks; and

in one-sixth it was more than four weeks.^c The mean duration of the 200 cases was 24·3 days; and the mean duration of 112 other cases, which were fatal, was 27·67 days. The mean stay in hospital of 500 cases which recovered was 31·24 days, and of 100 fatal cases, 16·52 days; while the average duration of illness before admission of the 600 cases was 10·78 days. Of Hoffmann's 250 fatal cases I have ascertained the mean duration of 215 cases to be 28·9 days.^d It is obvious that enteric fever, apart from complications and the chances of a relapse, is a much more protracted disease than typhus. (See p. 185.) My observations lend no support to the doctrine of critical days, as applied to enteric fever, although I have often noticed that it terminated about the 21st or 28th day.

When the fever is protracted beyond the middle of the fourth week, it is in most instances kept up by some complication or by non-cicatrizization of the ulcers in the bowel. Under these circumstances the fever is often marked by extreme prostration and emaciation and a tendency to bed-sores. Sir W. Jenner has expressed the opinion that, except in cases of relapse, fresh spots never appear after the thirtieth day, and that febrile symptoms after that date are always due to some incidental complication. I have met, however, with several instances in which fresh spots appeared daily as late as the thirty-fifth day; and in one remarkable case, where the general symptoms were mild, fresh spots were noted almost daily from the fourteenth to the sixtieth day (Case LV.). Griesinger has also observed that in uncomplicated cases the fever does not invariably terminate at the end of the fourth week.^e

On the other hand, enteric fever may terminate in death or in recovery at a comparatively early date. Most of the febrile attacks known in this country as 'simple continued fever,' or 'febricula,' are abortive attacks of enteric fever, terminating between the tenth and twentieth days (Cases LVI. and LVII.). In these cases the inflammatory products deposited in the intestinal glands are probably absorbed, and ulceration never takes place. (See *Varieties of Enteric Fever*.) Again, although death in enteric fever rarely occurs before the fourteenth day

^c Cases are not included in this calculation, in which there was a relapse, or in which the fever was prolonged by complications, after spots had ceased to appear on skin. In most instances the cessation of fever was determined by the thermometer.

^d HOFFMANN, 1869. In some of the cases the precise duration was not determined, and I have excluded others where death was due to pulmonary phthisis following enteric fever.

^e GRIESINGER, 1864, p. 244.

(in 29 of 250 cases, Hoffmann), in rare cases it may occur much earlier. In several instances I have known it take place about the twelfth day; in Cases LIX. and XLVII. the patients died on the seventh and on the sixth days. Bretonneau,^f Forget,^g Jenner,^h Bristowe,ⁱ and Trousseau,^j each record a case fatal on the fifth day; while Hoffmann^k and Trousseau each give the details of a case fatal in less than four days. Lastly, cases have been already referred to terminating fatally on the second (Case LVIII.), or even on the first day (p. 472). The symptoms in these rapid cases are usually severe headache and acute delirium, with profuse diarrhœa or great engorgement of the lungs.

CASE LV. *Enteric Fever remarkable for long Duration.*

William S——, aged 20, adm. into L. F. Hosp. *July 9th*, 1858. His illness had commenced on *June 27th* with diarrhœa, cold shivers, and pains in limbs.

July 10th (14th day). Pulse 96. Some quiet delirium in night. Circumscribed flush on cheeks, and about twenty lenticular rose spots on chest and abdomen. Tongue moist and furred; abdomen tympanitic and tender; four light watery stools.

Fresh spots were noted almost daily from this date till *Aug. 25th*, and on no day were they entirely absent. Pulse varied from 96 to 132. Tongue, for a few days, was dry and brown; but after *July 26th*, it was moist, red, and fissured. Bowels were all along relaxed; scarcely a day passed that patient did not void from two to six light watery stools. On *Aug. 9th*, there was considerable epistaxis. Intelligence was always good, and after *July 20th* the delirium at night ceased. Pupils were mostly dilated, and from *Aug. 9th* to *20th*, there was considerable deafness. Appetite began to return on *Aug. 3rd*, and on *Aug. 14th* patient was very hungry, although pulse was 120; twenty lenticular spots were counted on body, and there were four light watery stools. The patient ultimately recovered, and was discharged on *Sept. 10th*. The temperature was, unfortunately, not taken.

CASE LVI. *Enteric Fever, aborting on 10th day.*

Charles G——, aged 4, adm. into Middlesex Hosp. *Oct. 22nd*, 1869. Several other patients from the same house were in the hospital at the same time with enteric fever. C. G. had first complained on the afternoon of the 18th of pain in the head and stomach, thirst, and loss of appetite. On the morning of the 21st he had vomited, and at 4 A.M. of the 22nd diarrhœa set in rather severely—4 loose motions within a few hours. After admission, tongue moist with white fur and red

^f BRETONNEAU, 1829, p. 70.

^h JENNER, 1853, p. 260.

^j TROUSSEAU, 1861, p. 168.

^g FORGET, 1841, p. 119.

ⁱ *Lancet*, April 28, 1860, p. 422.

^k HOFFMANN, 1869, p. 38.



at tip and edges. Considerable heat of skin, but no spots. He was ordered a draught every two hours containing 15 minims of dilute hydrochloric acid, 2 minims of laudanum and syrup, with milk and beef tea. The diarrhoea was at once checked, and by the 27th (10th day) the fever had entirely ceased and the patient was quite convalescent. On Nov. 9th he was discharged from the hospital well. The morning and evening temperatures are shown in the following table.

TABLE XLIX.

Day of Fever	Morning		Evening	
	P.	T.	P.	T.
5	...	...	133	102.7
6	125	100.5	128	102.2
7	117	100.4	154	102.6
8	117	99.8	120	100.8
9	109	99.2	112	100.8
10	112	98.5	110	98.6
11	104	98.4	104	98.6
12	100	98.5	86	98.

The temperature was taken morning and evening for another week, but continued normal.

CASE LVII. *Enteric Fever, aborting on 16th day. Bowels confined.*

The following case I saw in consultation with Dr. R. D. Harling. The patient was also seen on two occasions by Sir W. Jenner, who confirmed the diagnosis.

Mr. D. W—, aged 23, sickened with pyrexia on March 13th, 1872. His symptoms during the first week were considerable fever with morning remissions, the highest temperature being reached on the evening of the 4th day (104.5° F.), great prostration, considerable headache and sleeplessness, thirst, loss of appetite, coated tongue with redness of tip and edges, no distension or pain of abdomen, and bowels confined. On the 7th day characteristic rose spots appeared, and they continued to come out in successive crops till the 15th day. The bowels were kept open by small doses of castor oil. On the morning of the 16th day, the patient, who had perspired freely in the night, felt much better, and the pulse, which had never exceeded 86, fell to 56; and on the 17th day the evening temperature became normal. On the 16th day the patient felt quite well and was desirous to get up.

The pulse and temperature from the 2nd day of the disease are shown in the following table. (See also Diag. XVII.)

TABLE L.

Days	9 A.M.		2 to 4 P.M.		9 P.M.		Days	9 A.M.		2 to 4 P.M.		9 P.M.	
	P.	T.	P.	T.	P.	T.		P.	T.	P.	T.	P.	T.
2	..	..	80	102'	84	103'	15	70	99'8	66	101'3	..	..
3	80	102'	..	..	82	103'	16	56	97'1	60	99'6	70	99'4
4	82	102'5	80	104'5	84	104'5	17	60	98'2	68	99'6	62	97'5
5	84	104'5	84	103'8	86	104'	18	68	98'2	72	100'1	..	..
6	84	103.	80	103'5	76	102'	19	52	97'5	..	..	66	98'
7	78	101'9	72	103'8	76	102'5	20	64	97'8	..	..	64	99'8
8	78	101'9	72	103'4	76	102'8	21	60	98'2	..	..	68	97'5
9	72	100'8	72	103'	74	101'5	22	64	97'8	64	97'8	..	..
10	72	102'6	78	103'	76	101'	23	64	97'2	72	98'2	..	..
11	70	100'2	72	103'5	74	101'	24	64	97'2	..	..	..	..
12	72	100'2	70	103'5	70	100'	25	72	98'2	..	..	..	..
13	72	100'5	72	102'5	70	100'6	26	72	97'2	..	..	..	..
14	72	99'8	64	101'	68	100'	..	..	..	..	..	..	..

CASE LVIII. *Enteric Fever, fatal on 2nd day.*

In June 1861, a girl, aged 9, was admitted into the Middlesex Hospital. Her father had been suffering for two or three weeks from enteric fever, but the girl had been quite well the day before admission, when she had been suddenly seized with vomiting and febrile symptoms, followed by severe purging, intense headache and acute delirium, which symptoms continued until death, 47 hours from the time of her seizure.

Autopsy.—The solitary glands in the lower two yards of the ileum and in the colon were enlarged to the size of a hemp-seed or split pea, and contained a yellowish-white morbid material. Peyer's patches were similarly affected, but there was no ulceration. The mesenteric glands were as large as hazel nuts, and congested. A figure (16) of the lower end of the ileum will be found under the head of 'Anatomical Lesions.' (See also p. 472).

CASE LIX. *Enteric Fever, fatal at end of seven days.*
Commencing ulceration.

For the particulars of the following case I am indebted to Mr. J. N. Radcliffe.

Thomas R—, aged 40, a weaver, died suddenly in 1848 from long-standing valvular disease of the heart, having suffered for *exactly* seven days before death from pyrexia, the symptoms of which were slight shiverings, hot dry skin, great lassitude, headache, tongue coated and very red at the tip and edges; no diarrhoea. The symptoms were not sufficiently severe to prevent him working up to the day of his death. His wife had, shortly before, recovered from a severe attack of enteric fever.

Autopsy.—Mitral valve extensively diseased, with much calcareous deposit. In lower third of ileum and first nine inches of colon, Peyerian and solitary glands were much enlarged and prominent, and there was a distinct ulcer in a patch upon the upper margin of the ileo-colic valve. Mesenteric glands much enlarged.



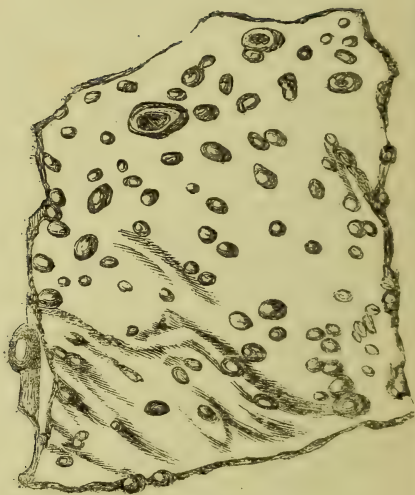
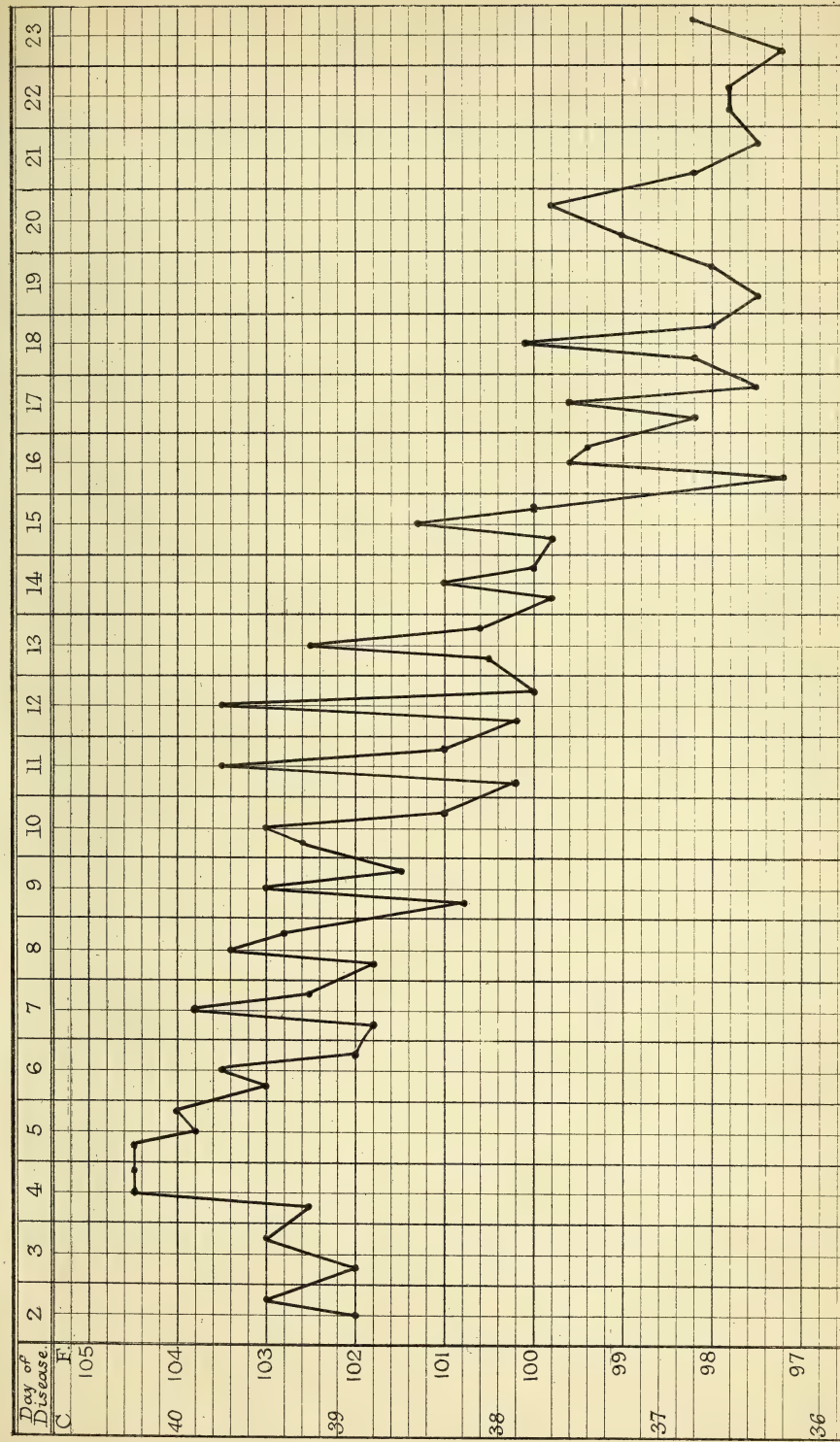




DIAGRAM XVII. Temperature in a case of Enteric Fever, with rose spots, aborting at end of 2nd week. Case of M.D.W. aged 23 March 1872.



For a paper on Relapses - See Dr. Irving
West J. G. Jan. 11 - 1879

*c. Relapses.*¹

By a relapse of enteric fever is understood a second evolution of the specific febrile process, after convalescence from the first attack is fairly established. Relapses must not be confounded with the *recrudescences*, which are common during the stage of ulceration. (See p. 546.) It is possible, however, that a true relapse may occasionally overlap the primary attack without any apyretic interval, and that this may be the explanation of certain cases of enteric fever which are unusually protracted; but post-mortem examinations of such cases are still wanting.

During seven years (1862-8), relapses were observed in 80 of 2,591 cases in the London Fever Hospital, or in 3 per cent.; Griesinger noted them in 6 per cent. of 463 cases at Zurich; Human, in 8 per cent. of 548 cases at Leipzig; and MacLagan, in 13 (10 per cent.) of 128 cases at Dundee.

After a convalescence from the first attack of ten or twelve days, the temperature again rises, and the patient is attacked with rigors or chilliness, followed by the ordinary symptoms of the first attack, viz. headache, pains in the limbs, loss of appetite, furred tongue, nausea, and often retching, diarrhoea, enlargement of the spleen, and a fresh eruption of rose spots. The fever reaches its maximum between the fourth and sixth day. The eruption usually appears earlier than in the first attack. Of 38 cases I found that it appeared on the third day in 7; on the fourth, in 8; on the fifth, in 7; on the sixth, in 2; on the seventh, in 12; and at a later date, in 2. It is on the presence of the eruption, and on the absence of any local inflammation to account for the pyrexia, that the diagnosis of a true relapse must be based.

Stewart, Trousseau, Wunderlich, and MacLagan have recorded rare instances in which there was a second relapse, or a third attack; two also have occurred in my own practice. (See Diag. XVIII.)

The duration of the second attack is usually, but not necessarily, shorter than that of the first. Of 24 cases collected from various sources by Michel, the mean duration of the first attack was 27 days; of the intermission, 11 days (shortest 2 and longest 31 days; and of the relapse, 16 days, longest 30).

¹ Relapses in enteric fever were first described by Schultz in 1830 (see EBSTEIN, 1869), and since then they have been studied by many observers, and more particularly by A. P. Stewart (1840), Hamernjk (1846), Thierfelder (1855), Michel (1859), Griesinger (1864), Ladé (1866), Ebstein (1869), Wunderlich (1871), and MacLagan (1871). (See *Bibliography*.)

In 53 cases which have come under my own observation, the duration has been as follows:—

TABLE LI.

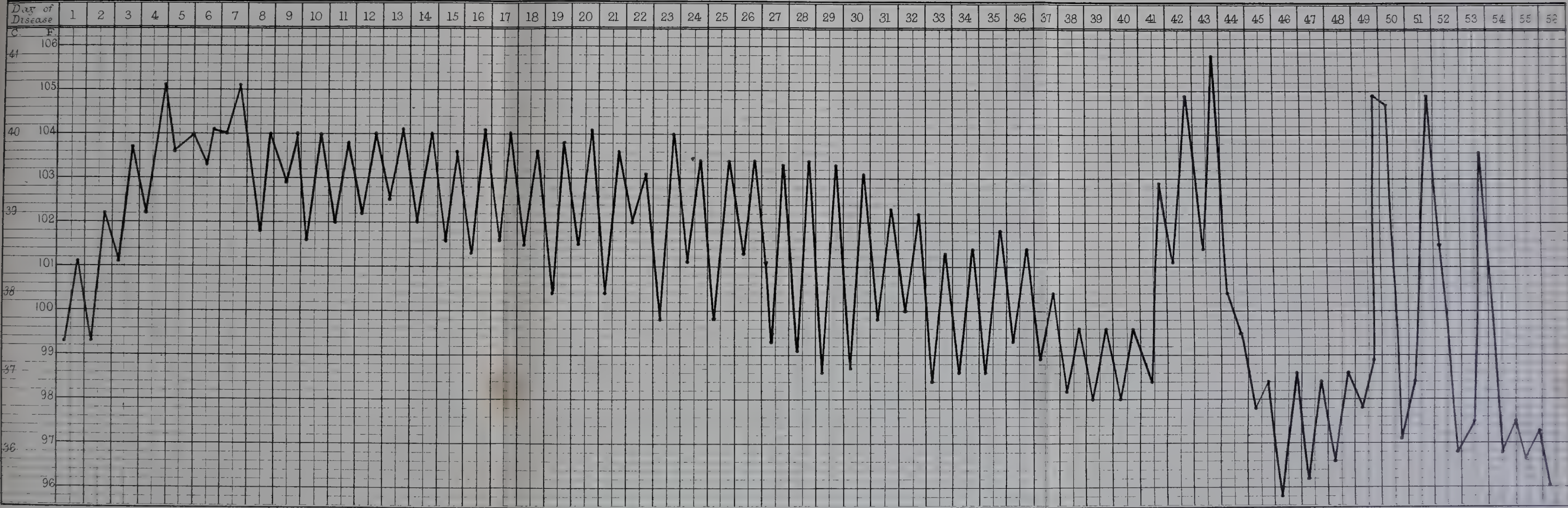
Showing duration in days of 53 cases of Enteric Fever followed by a Relapse.

* denotes fatal cases.

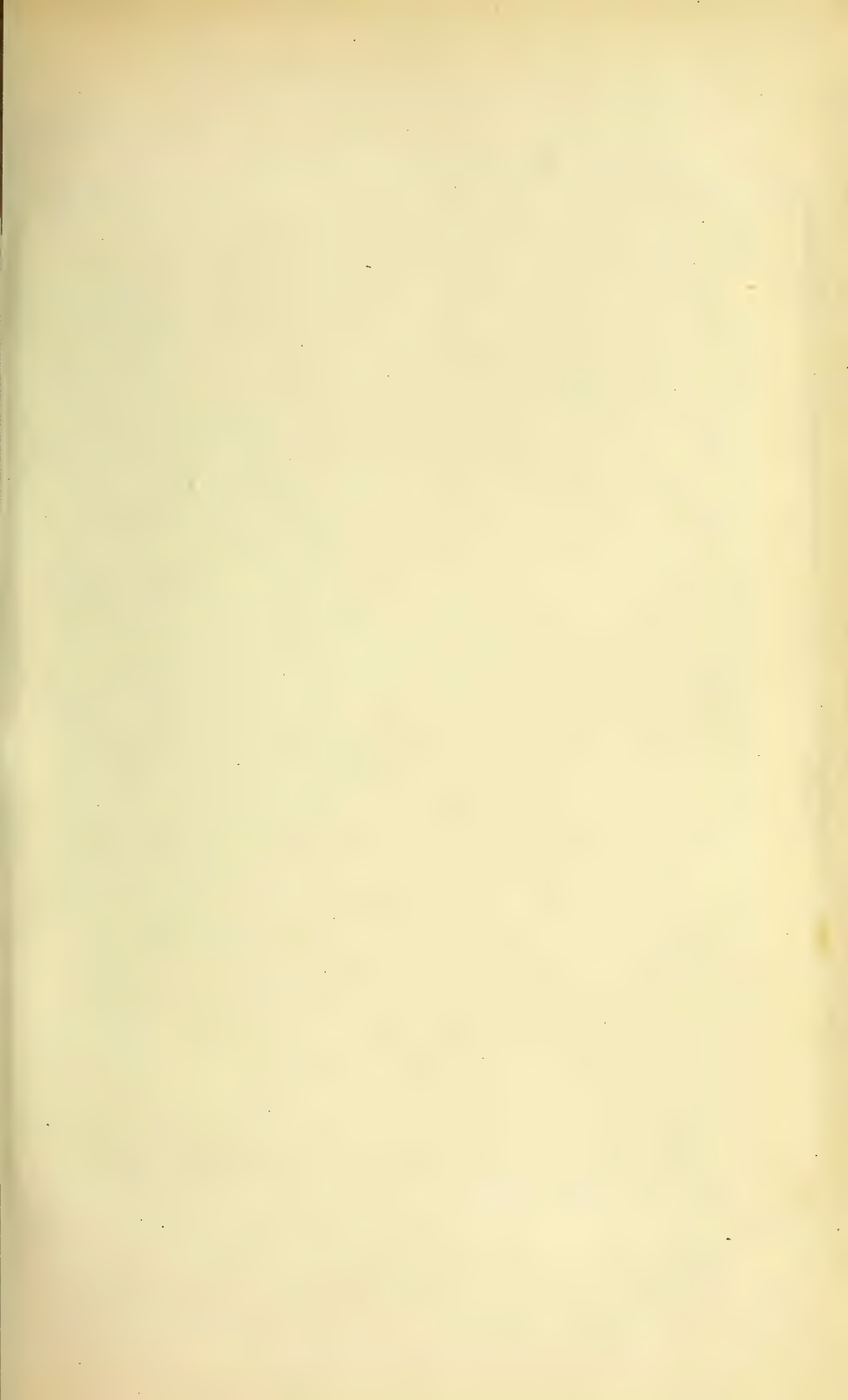
Males					Females				
Age	First Attack	Inter-mission	Relapse	Total Duration	Age	First Attack	Inter-mission	Relapse	Total Duration
35	16	3	18	37	?	14	10	12	36
18	28	6	10	44	5*	21	10	9	40
27	24	10	10	44	18	22	7	12	41
15	24	9	11	44	9	24	8	12	44
21	24	7	14	45	30	16	10	20	46
13	24	10	12	46	39	25	8	14	47
5	22	14	10	46	25	26	10	12	48
18	26	9	13	48	12	24	12	14	50
18	24	12	13	49	22	21	15	14	50
24*	32	10	7	49	21	14	9	28	51
27	28	7	14	49	15	26	14	11	51
11	21	14	14	49	15	26	10	16	52
24	23	9	18	50	19	24	14	16	54
25	24	12	14	50	17	28	9	19	56
32	30	9	12	51	16	30	12	18	60
14	32	9	10	51	19	38	12	14	64
14	21	14	16	51	20	30	16	18	64
24	28	10	14	52	16*	36	16	13	65
18	26	14	13	53	16	46	12	13	71
16	24	18	12	54	43*	27	8	39	74
24	21	8	26	55	27	41	25	21	87
16	24	8	24	56					
16*	30	12	14	56	Average	27	11.76	16.4	54.8
40*	28	14	15	57	Average of Males and Females	26.58	11.27	15	52.86
15	28	15	14	57					
15	25	19	14	58					
44	34	15	10	59					
25	37	10	14	61					
25	30	10	21	61	M. 23*	?	?	14	?
12	39	11	13	63	F. 22*	?	?	28	80?
Average	26.5	10.9	14	51.5					

As a rule, the relapse is milder than the primary attack, and the patient recovers, but there are many exceptions. In several instances I have known the first attack mild and abortive, but the relapse severe and protracted, and in one-third of my cases the symptoms were more severe in the relapse than in the first attack. Moreover, of my 53 cases 7 were fatal; in 2 of the cases death was due to perforation; in 2 to peritonitis, induced by infarctions in the spleen, and in 1 to abortion. Of 21 cases

DIAGRAM XVIII. *Temperature-range in a severe case of Enteric Fever with relapses. After Wunderlich.*







observed by Maclagan (13) and Bäumlér (8)^m all recovered; but of Ebstein's 13 cases, 3 died.

Post-mortem examination of fatal cases discloses the recent intestinal disease of the relapse, coexisting with the cicatrizing ulcers of the first attack; but, as those glands only become inflamed which have formerly escaped, the lesions of the relapse are usually less extensive than those of the first attack, and for the same reason they are often farther distant from the ileo-colic valve or in the colon. Fresh enlargement of the mesenteric glands and of the spleen is also found. Trousseau denied that any fresh disease of the bowel occurs in these cases, and regarding the intestinal lesion as the specific eruption of the fever, he maintained that these were not true relapses.ⁿ But in this opinion Trousseau stood alone. The observations of Stewart, Hamernjk, Griesinger, Thierfelder, Wunderlich, Peacock,^o H. Weber,^p Habershon,^q Ebstein, &c., agree with my own as above detailed.

It is difficult to give a satisfactory explanation of these relapses. In my experience they have been more common in males than females, the proportion having been as 3 to 2, but Griesinger found them more common in females. Age has no influence in their production; the youngest of my patients was 5 years, and the oldest 44. Barthez and Rilliet noted relapses in 3 of 111 children.^r They are often attributed to errors in diet, but I have never been able to trace them to such a cause, and it is *à priori* improbable that any error in diet should bring back the intestinal disease and the cutaneous eruption. They vary in frequency at different times and in different epidemics; and, although they are comparatively rare, I have known them occur in three members of one family. Griesinger has suggested that they may possibly be due to a fresh contagium from other patients with enteric fever in the same ward, but this view is negatived by the circumstance that relapses occur in solitary cases treated in private dwellings; while the fact of their also occurring in patients removed for treatment to hospitals prevents our ascribing them to a fresh poisoning from the original source. More than a quarter of a century ago Hamernjk maintained that the relapses were to be accounted for by a resorption of the 'typhous material' thrown

^m BÄUMLER, 1866.

ⁿ TROUSSEAU, 1861, p. 158. 'Quoique l'appareil symptomatique soit très complet, quoique l'éruption cutanée se reproduise, la lésion caractéristique de l'intestin ne se renouvelle pas.'

^o *Trans. Path. Soc.* ix. 209.

^p *Ib.* xii. 96.

^q *Med. Times and Gaz.* February 9th, 1867. ^r BARTHEZ and RILLIET, 1853, ii. 691.

off by the patient's own bowel, and this view has been recently very ably advocated by Dr. T. J. Maclagan, who believes that healthy glands become inoculated by the sloughs thrown off from those first affected. Keeping in mind the cause why the glands seem to become inflamed in the first attack, there is much in this view to commend it; but, if this be the correct interpretation of relapses, it furnishes another argument against the specificity of the poison of enteric fever, for in that case the fact of an individual having passed through an attack of the disease even immediately before does not protect him from a fresh infection. (See p. 469). Moreover, it is to be observed, that it is only the dead and putrid material thrown off from the intestinal glands which can be hurtful, for no bad result ensues in abortive cases, when the inflammatory products in these glands are absorbed without sloughing, while in every case of enteric fever the inflammatory products in the mesenteric glands, which are identical with those in the intestinal, are absorbed without any appreciable harm to the patient. In accordance with his view, Maclagan further maintains that relapses are only met with when there has been constipation during convalescence. Unfortunately, the condition of the bowels in the first convalescence was not noted in most of my cases, but in several there was certainly diarrhoea, and it does not appear that relapses have been prevented by counteracting the constipation with aperients. It is remarkable, ~~however~~, that at the London Fever Hospital, where constipation was rarely (perhaps too rarely) meddled with, they were, as already shown, much rarer than in the experience of Maclagan, in several of whose relapsing cases also, castor oil was administered during the interval between the paroxysms.³

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CASE LIX. *Enteric Fever. Mild Attack, followed by a severe Relapse.*

James R—, aged 25, adm. into L.F.H. June 20th, 1865. Had been ill for two or three weeks with slight fever, but no diarrhoea. His chief symptoms after admission were great prostration, quick feeble pulse, slight elevation of temperature, a few small rose spots, and occasional sickness. At the end of a week he was convalescent,

Case Lxx)
+
* It may be added that in two of my fatal cases the fresh lesions were higher up in the ileum than those of the first attack, although a contrary arrangement might be inferred from a perusal of Maclagan's essay. My experience is also opposed to that of Maclagan, who states that in none of his 13 cases was there severe diarrhoea during the first attack; for this occurred in fully one-third of my 53 cases. It may be also worth mentioning that relapses occurred in 2 out of 9 of my patients who had been treated with carbolic acid.



+ Tuberculosis.

Tuberculosis Keittantia a sequel of Enteric
Fever. Dr. W. F. Gaudner. May 1875.

Diabetes as a sequel of Enteric Fever.
I have met with two cases where first sym-
ptoms occurred during convalescence from
Enteric Fever.

but the bowels were very confined, and were kept open by castor-oil and simple injections. On *July 8th* he left hospital, feeling strong and having a good appetite. Two days after discharge again taken ill with fever and pain in abdomen; took a purgative which purged him rather severely, and was readmitted on *July 12th*. He had now a very severe attack of enteric fever, which lasted for nearly a month, and was characterized by extreme prostration, vomiting, diarrhoea, dry brown tongue, typhoid symptoms, and subsultus. Rose spots appeared in successive crops from *July 15th* to *25th*. Convalescence protracted by otorrhœa, and was unable to leave hospital until the end of August.

SECTION VIII.—COMPLICATIONS AND SEQUELÆ.

Many of the complications and sequelæ of enteric fever are the same as those already described under the head of typhus; others are peculiar to enteric fever. The latter only require a detailed consideration.

a. Diseases of the Respiratory Organs. (See p. 190.)

1. *Bronchitis* is not uncommon, although rarer than in typhus. Some years ago I noted it in 21 out of 100 cases. It may be one of the earliest phenomena of the disease, and in a large proportion of the cases which terminate fatally within the first ten or fourteen days death is due to bronchitis and hypostatic engorgement of the lungs. (Case LXI.) More commonly both these conditions supervene in the fourth week, and then also they may lead to a fatal result, or may keep up the fever and retard convalescence for many weeks. The bronchitis is sometimes aggravated by spasmodic attacks of cough and dyspnoea in which death may appear imminent, but from which the patient often recovers.

CASE LXI. *Enteric Fever Fatal on 13th day from Congestion of Lungs.*

Marian B—, aged 28, was a 'sister' in the Middlesex Hosp. She had been very prone to acute specific diseases. When 21, she had typhus; when 25, though vaccinated, she had contracted small-pox, and in the following year she had a severe attack of scarlet fever. On *Sept. 17th*, 1870, her fatal illness commenced with chilliness and thirst, and on *Sept. 19th* she took to bed, complaining of very severe headache, frequent and violent retching, and high fever. There was intense thirst, but no tenderness or distension of abdomen, and the bowels were constipated. On *Sept. 23rd (7th day)*, when I first saw her, the same symptoms persisted. Pain in head intense, and described as 'bursting,' with occasional flashes of light before eyes; no sleep for

+ Secondary affections - See Rev. in Dublin

several nights; mind clear; frequent vomiting; tongue thickly coated and white; bowels confined; pulse 120; temp. 103.4°; no eruption. On evening of *Sept. 25th* (9th day), patient became much worse; pulse 120; temp. 103.4°; respiration 44; signs of hypostatic engorgement of both lungs; wild, anxious look, with delirium, subsultus, and tremors. On 10th day, pulse 112; resp. 60, and irregular; temp. 104.8°; tongue dry; bowels confined; no albumen in urine; headache and vomiting less urgent, but occasional delirium; a few petechial spots, but none characteristic of any form of fever. On 11th day, carphology; pulse 135; resp. 65; temp. 104.8°. On 12th day, for first time, slight diarrhoea; three ochrey stools. On 13th day, face and lips livid; moist râles all over lungs, but no power to cough; albumen ($\frac{1}{10}$ in volume) in urine; temp. 103.2°; tongue dry; no diarrhoea; very heavy and prostrate, but apparently conscious. Died at 7.30 p.m. The treatment consisted in brandy, ether, and ammonia, with sinapisms to chest; then in small doses of turpentine with dry cupping; and, last of all, 8 oz. of blood were taken from the chest by cupping ~~over~~ chest, with apparently temporary relief to the breathing.

Autopsy.—Intestine only examined. Characteristic lesions of enteric fever in lower three feet of ileum; the agminated and solitary glands much enlarged and elevated, but no ulceration.

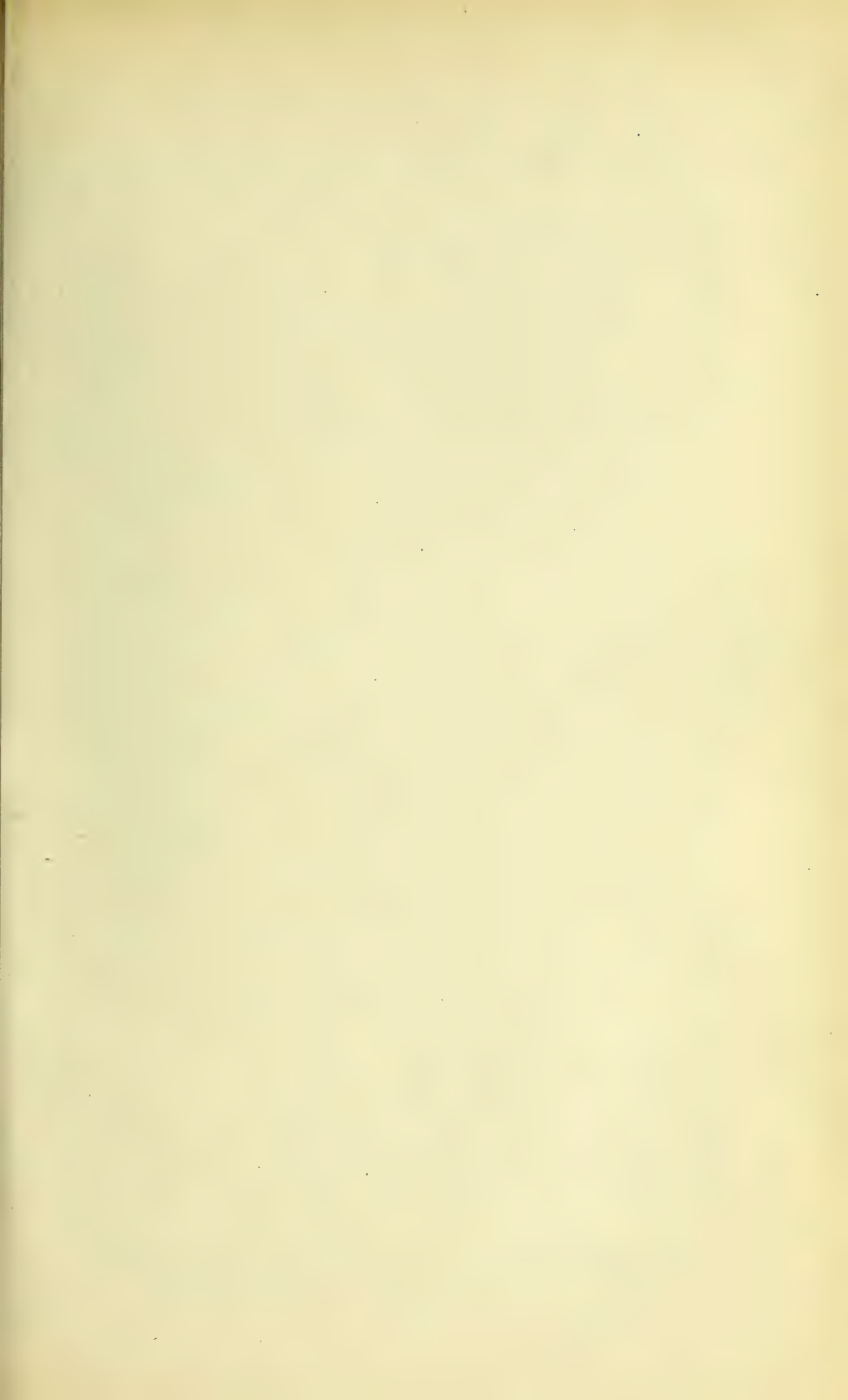
2. *Pneumonia* is more common than in typhus. I noted it in 13 out of 100 cases, and Flint in 12 of 73 cases.^t (Cases XLVIII. and XLIX.) It may be lobar or lobular; more commonly it is lobular, and then it may terminate in small abscesses, or very rarely in *gangrene*. Pneumonia rarely supervenes before the third or fourth week; in rare cases it occurs early in the attack, and may be mistaken for the primary disease.

3. *Pleurisy* is also more common than in typhus, and occasionally it terminates in empyema, or in an interlobar pleural abscess. I have notes of two cases of empyema; in one, the pus burst into the lung and the patient recovered; in the other, paracentesis and the drainage-tube were resorted to, and the patient at first did well, but died nearly a year afterwards of phthisis. Peacock records the case of a patient who, when convalescent from enteric fever, suddenly expectorated a large quantity of pus which was supposed to come from a circumscribed pleural abscess, and eventually recovered.^u

4. *Tubercular Deposit* in the lungs and elsewhere is a more common sequel of enteric fever than of typhus, as might have been expected from its longer duration and the greater emaciation which it entails. Louis records four fatal cases of enteric fever,

^t BARTLETT, 1856, p. 47.

^u *Med. Times and Gaz.* April 26th, 1862.



in which the lungs were found studded with recent tubercles, and Bartlett observes that consumption is a common sequel of enteric fever in America.^v Tubercle ought always to be feared when hectic fever and bronchitis persist after the end of the fourth week. (See pp. 192 and 453.)

5. *Laryngitis* is occasionally a very serious complication of enteric fever. It may assume different forms. Ulceration of the mucous membrane of the larynx or trachea constitutes the *laryngitis* or *perichondritis typhosa* of Rokitansky and other German pathologists. According to Trousseau^w it is most apt to occur in cases where there is unusual prostration, where the disease has been very protracted, and where the diet has been too rigorous. In Germany it appears to be very common; Griesinger, for example, found ulceration of the larynx in 31 out of 118 autopsies.^x In this country it is comparatively rare, but I have sometimes found it in the dead body when there had been no symptoms referable to the larynx during life. But, when present, it is always liable to excite acute œdema of the glottis, necessitating tracheotomy, or causing death by asphyxia, or to induce necrosis and exfoliation of the cartilages, abscesses in the neck, and permanent disease of the larynx.^y Acute œdema of the glottis may supervene in the advanced stages of enteric fever independently of ulceration of the larynx. I have also known it to occur in conjunction with erysipelas of the head and face, and two cases of this sort are recorded by Jenner. Several examples of enteric fever complicated with diphtheria have come under my notice; Louis records three, and Forget two cases; while Rilliet and Barthez mention six cases in children. In connection with these different forms of laryngitis, collections of matter sometimes form in the submucous tissue. *which may extend around pharynx or down into œsophagus.*

CASE LXII. *Enteric Fever. Necrosis of Cartilages of Larynx. Extravasation in Recti Muscles.*

Richard C——, aged 22, adm. into L.F.H., March 26th, 1869, in third week of a severe attack of enteric fever. Pulse 120–140; typical rose spots; tongue dry, red, and cracked; diarrhœa. On April 7th (about 30th day), difficulty in swallowing. April 9th. Troublesome cough. April 10th. Cough and breathing distinctly laryngeal, voice husky, and air entered lungs imperfectly from some obstruction in windpipe. Pulse 140. April 11th. Breathing no

^v BARTLETT, 1856, p. 120. ^w TROUSSEAU, 1861. ^x GRIESINGER, 1864, p. 211.

^y For further information on this subject, see TROUSSEAU, 1861, and PACHMAYR, *Verhandl. der Phys. Med. Gesellschaft in Würzburg*, 1868, bd. i.

better, and makes a loud hissing noise. No lividity of face. Swallowed dinner (liquids) fairly at 1 p.m., and conversed with friends, but died suddenly at 5 p.m.

Autopsy.—Extensive typhoid ulcers in lower end of ileum, cicatrizing. Below right vocal cord was a sloughy ulcer, half an inch long, opening into an abscess around cricoid cartilage, which was quite bare. In lower part of each rectus abdominis muscle was a cavity as large as a hen's egg, one containing pure blood, and the other a reddish purulent-looking matter, evidently altered blood.

6. *General Emphysema and Pneumothorax.* Chomel and other writers alluded to several instances in which extensive emphysema of the subcutaneous areolar tissue was observed during life,^a and this complication was likewise observed by the army-surgeons in the Crimea; but its origin was first satisfactorily explained in 1857, in a communication made to the Pathological Society by Dr. Wilks. A boy, aged 12, became emphysematous on the twelfth day of an attack of enteric fever, the emphysema commencing in the neck, spreading to the face, arms, and chest, and greatly impeding deglutition. Death occurred on the twenty-second day, when it was found that the air had escaped through a sloughing ulcer of the larynx, situated at the posterior junction of the vocal cords.^a Sometimes, as in typhus, emphysema is caused by the ulceration of a small bronchial abscess or gangrenous cavity in the lung. Gairdner has known pneumothorax induced in this way in at least 4 instances of enteric fever;^b and one case where this happened has been recorded by Beck.^c

b. Diseases of the Organs of Circulation. (See p. 193.)

1. *Hæmorrhages.* Epistaxis and intestinal hæmorrhage are not uncommon (see pp. 525, 542), but sometimes bleeding takes place from the gums, kidneys, bladder, and other mucous surfaces, constituting what has been called 'hæmorrhagic putrid fever.'

2. *Pyæmia.* I have met with many instances in which during convalescence abscesses have formed beneath the skin in different parts of the body, and similar cases have been published by Louis,^d Forget,^e and Peacock.^f Many such cases recover. In rarer instances pus is deposited in the joints or in some of

^a CHOMEL, 1834.

^a *Trans. Path. Soc.* ix. 34.

^b W. T. GAIRDNER, 1865.

^c *Verhandl. der Phys. Med. Gesell. in Würzburg*, 1868, p. 27.

^d LOUIS, 1841, Case 15.

^e FORGET, 1841, Cases 45 and 46.

^f *Med. Times and Gaz.* April 26th, 1862.



Care & Acute Purulent Infl.ⁿ of Mediastinum
in Typhoid. Frantzel, Lond. Med. Rec.
July 1 - 1874.

the internal organs, and then the case usually terminates fatally. (See p. 194.)

3. *Venous Thrombosis* has been fully described under the head of Typhus. (See p. 195.) It is a more common sequel of enteric fever, although a contrary opinion has been expressed by Stewart^g and Begbie.^h Obstruction of the femoral vein has occurred in fully one per cent. of the cases under my care. Of 17 cases it was restricted to the left leg in 14, to the right in 1, and both limbs were implicated in 2. Three of the 17 patients died; in one death was due to intestinal hæmorrhage and effusion in the pleura; in a second case it was caused by bed-sores and sloughing of the nates; while the third patient had also jaundice, albuminuria, and a very feeble heart, and died six months after the commencement of the fever. Mac-lagan noted swelling of one leg once in over 200 cases.ⁱ

4. *Arterial Thrombosis*. Spontaneous gangrene is less common than in typhus. (See page 199.) In rare instances, however, I have met with gangrene of the feet, of the ears, of the penis, of the labia and vagina, of the corneæ, and even of the anterior wall of the abdomen. Many other instances of the same sort will be found in the memoir of Patry,^j in Trousseau's Clinical Lectures, and in the references given below.^k Patry records one remarkable case in which sphacelus, commencing in the left ear, but extending to the forehead, eyelids, and cheek, resulted from obstruction of the external carotid artery.

5. *Diseases of the Heart*. The valves of the heart rarely become diseased in enteric fever, but degeneration of the muscular walls occasionally leads to the same results as in typhus. (See page 200, and *Anatomical Lesions*.)

c. *Diseases of the Nervous System*. (See p. 203.)

1. *Meningitis*. As in typhus, the cerebral symptoms of enteric fever are independent of inflammation, but true meningitis does occasionally result from pyæmia, disease of the internal ear (Case LXIII.), or tubercle, and in very rare instances it occurs independently of such causes. References to several cases are given by Griesinger,^l and Trousseau has recorded an interesting case of enteric fever complicated with tubercular meningitis.^m

^g STEWART, 1857.

^h BEGBIE, 1872.

ⁱ BEGBIE, 1872.

^j PATRY, 1863.

^k *Gaz. Hebdomad.* 1867, p. 651; *Med. Times and Gaz.* 1867, ii. 521; *Verhandl. der Phys. Med. Gesellschaft in Würzburg*, 1868, i. 18.

^l GRIESINGER, 1864, p. 224.

^m *Union Méd.* Août 6, 1859.

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CASE LXIII. *Enteric Fever followed by Disease of the Temporal Bone and attacks of Meningitis.*

Annie W—, aged 16, adm. into Middlesex Hosp. Jan. 14th, 1867, on fourth day of an attack of enteric fever. During the attack there were characteristic rose spots and considerable diarrhoea, the tongue was dry, red, and smooth, and the range of temperature was that of enteric fever. In the early stage the headache was unusually severe, and subsequently there was much delirium and stupor, with tremors and subsultus, congestion of the lungs, and albuminuria. Convalescence commenced on the 28th day, the temperature throughout that day being normal. During convalescence the mind remained feeble. On the 34th day there was a return of pyrexia, which lasted only for a day, but was followed by pain and deafness of the left ear, these symptoms ceasing on the appearance of a purulent discharge from the ear on the 39th day. On the 48th day she was able to get up, and on the 77th day (March 28th) she went to the Convalescent Hospital, the discharge from the ear persisting. As soon as she arrived at Walton she began to complain of pain in the left side of the head, which on April 7th became very severe, and was accompanied by pyrexia, acuteness of hearing, and vomiting. On April 11th she was readmitted into Middlesex Hospital with these symptoms, which subsided on April 13th on a copious discharge of fetid pus from the ear. On April 24th she had a rigor, followed by a return of the headache and vomiting, although the discharge from the ear continued profuse, and on May 1st considerable swelling was noticed over the left mastoid process. An incision made over this came down upon bare bone. On June 11th she again left the hospital, the discharge from the left ear persisting, and the wound behind the ear unhealed and communicating with bare bone. A fortnight afterwards the cerebral symptoms returned, and several small pieces of bone came away from the sinus behind the ear. She was again in the hospital from July 10th to 30th, and during the following autumn and winter she had repeated attacks of headache and vomiting. On March 7th, 1868, she was admitted a fourth time into the hospital with the same symptoms as before, accompanied by twitchings of the extremities and unconsciousness. She left the hospital on March 29th, and for nearly a year continued well, but in Feb. 1869 she had another attack of headache and vomiting. She was last seen in June 1, 1869, in good health, and with no discharge from the ear, but completely deaf on the left side. The attacks were usually preceded by a cessation of the discharge from the ear, and the cerebral symptoms subsided when this was re-established. The treatment which always relieved the attacks consisted in leeches, blisters, and setons behind the ear, poultices over the ear, and injecting it frequently with warm water, together with purgatives and iodide of potassium.

2. *Mental Imbecility and Mania.* After severe and protracted cases, more or less fatuity is occasionally observed during



On Intermittent Fever as a cause of Insanity
See Stendel - Land. Med. Record

Nov. 19. 1873

Dr. Greenfield's paper in N. Eng.
Harv. Rep.

For cases of Intermittent Fever complicated
with Aphasia. See Lancet, May 17/73
p. 724 and July 26/73.

For paralysis after Intermittent Fever, see Sir
John MacFarlane - B. M. Journ Jan 22/75

Case of Intermittent Fever with P. Hemiplegia and
Aphasia. Reported by W. B. C. Gray.
Med. T. & G. March 27. 75.

also Med. T. & G. Feb. 23/78

convalescence. The patient exhibits a childishness of manner and want of memory, and is the subject of delusions. One little girl under my care believed the nurse to be her aunt, and some of the other patients her sisters; another thought that he had inherited a fortune, with which he intended to enrich the hospital; while a third became very excited every evening, and wished to be removed to an asylum. Bartlett quotes the case of a young man, who had previously borne a good character, but who, after recovery from a grave attack of enteric fever, exhibited a strong propensity to steal.ⁿ In several instances I have known a patient, after convalescence was fairly established, suddenly attacked with violent maniacal delirium without any elevation of temperature. Similar cases have been observed by Griesinger,^o H. Weber,^p Handfield Jones,^q Ogle,^r &c. These symptoms depend, not upon inflammation, but upon an anæmic or atrophied state of the brain. Mania as a rule soon subsides under appropriate treatment, but the other forms of mental derangement may last for months, although I know of no case where they have been permanent. (See p. 204.)

3. *General Convulsions.* (See page 539.)

4. *Paralysis* is an occasional sequel of enteric fever. It may not supervene till many weeks after the commencement of convalescence, and it is usually temporary, recovery taking place within a few weeks or months. According to Nothnagel,^s who has made it the subject of a special memoir, the most common form is paraplegia, but it may also take the form of hemiplegia, strabismus, paralysis of the portio dura, motor paralysis of individual spinal nerves such as the ulnar or peroneal, or local anæsthesia. West mentions the case of a child who had convulsions followed by hemiplegia, and recovered.^t Several cases of temporary aphasia after enteric fever in children have been recorded by Weisse and Friedrich,^u and a case of temporary paraplegia has been observed by Mr. B. Bell.^v Now and then these attacks of paralysis, particularly in the legs, terminate in atrophy of certain of the muscles, and I have met with several instances where permanent dis-

ⁿ BARTLETT, 1856, p. 51. ^o *Mental Path. and Therap. Syd. Soc. Transl.* p. 181.

^p *Med. Chir. Trans.* xlviii, 148.

^q *Brit. Med. Journ.* 1867, i. 27.

^r *Ib.* i. 385.

^s NOTHNAGEL, 1872.

^t WEST, 1848, 5th ed. 1865, p. 744.

^u *Gaz. Hebdom.* 1865, 140, 591.

^v *Edin. Med. Journ.* May 1870.

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 tortion has resulted.^w One of my patients, a girl, aged 18, had all the signs of paralysis of the right third nerve in a marked degree throughout an attack of enteric fever; this had first occurred fourteen years before, after an attack of measles, but ~~had~~ for many years had almost disappeared until the seizure with enteric fever, on convalescence from which only slight ptosis remained. The cause of the post-febrile paralysis is obscure, but is believed by Nothnagel to be similar to that of diphtheritic paralysis, which, according to Oertel and Buhl, is due to cell-proliferation in the sheaths of the nerves and between the fasciculi. (See p. 205.)

5. *Neuralgia and Hyperæsthesia* in different parts of the body are much rarer sequels of enteric than of relapsing fever, but cases in which they have been observed have been recorded by Nothnagel,^x and other writers.

6. *Muscular Tremors and Chorea* are also, according to Nothnagel, occasional sequels of enteric fever.

d. *Diseases of the Organs of Special Sense.* (See page 206.)

1. *Otorrhœa* is not an uncommon complication or sequela, particularly in children.^y I have seen many examples. Suppuration of the internal ear occasionally terminates in meningitis; examples are recorded by Louis^z and Peacock.^a (See also Case LXIII.)

2. *Deafness*, independently of otorrhœa, is an occasional sequel. (See p. 542.)

3. *Amaurosis*, usually incomplete, occasionally occurs during convalescence. Examples of amaurosis and amblyopia are referred to by Nothnagel,^b and Gillespie mentions a case in which there was total blindness for six weeks.^c

4. *Sloughing of Corneæ.* (See page ✓.)

e. *Diseases of Organs of Digestion.* (See page 207.)

1. *Pharyngitis.* Dysphagia may result from dryness of the throat, in severe cases from muscular paralysis, and sometimes in children it is a purely nervous affection, attempts to swallow inducing a spasmodic cough resulting in the rejection of fluids by the nose.^d But sometimes it is due to an inflammatory

^w See also H. JONES, *Med. Times and Gaz.* 1866, i. 390.

^x NOTHNAGEL, 1872.

^y RILLIET and BARTHEZ, 1853.

^z LOUIS, 1841, ii. 92.

^a PEACOCK, 1856 (No. 1).

^b NOTHNAGEL, 1872.

^c GILLESPIE, 1870.

^d TAUPIN, 1839.

One recovery See my Lectures on Liver

Intensification of Liver with marked
Adynamia in 3rd week of Typhoid.
Lancet Clin. Med. Paris, 1874 p. 24.

Remission of G.B. with alternating
enlargement of Liver in Typhoid. - Recovery
St. p. 55.

Lamprosis in Enteric Fever. Lancet. Oct. 17/74
and Oct. 31/74

affection of the pharynx, which in several of my cases has been diphtheritic. Louis noted dysphagia in 10 out of 46 fatal cases, and in 13 of 55 cases which recovered. In the latter, the fauces were much injected; in the former, recent disease, such as ulceration or diphtheritic exudation, was found in the pharynx or œsophagus after death.

2. *Vomiting*. Constant vomiting of food occasionally occurs during convalescence. Trousseau says that this is often nervous, and is best treated by giving solid food.*

3. *Diarrhœa*. The intestinal ulcers, instead of cicatrizing, sometimes become 'atonic,' and may give rise to exhausting diarrhœa after the fever has ceased.

4. *Dysentery*. In several instances I have known the symptoms and lesions of dysentery to coexist with those of enteric fever. The diagnosis in some of these cases during life was extremely difficult. Similar observations have been made by Forget,^f Lyons,^g and Gairdner.^h

5. *Jaundice*. I have met with jaundice in three cases of enteric fever, all of which were fatal, although in two the jaundice had disappeared before death. In two of the cases there was an autopsy, and in both the liver was small, and its secreting cells loaded with oil. Two cases are recorded by Louis,ⁱ two by Frerichs,^j and one by Jenner^k which occurred on the west coast of Africa. All of these cases were fatal, but Dr. Robert Barnes has given me the particulars of a case which terminated favourably. In most cases the jaundice does not appear until late in the disease; but in one case reported by Frerichs it appeared as early as the 5th day, and death occurred on the 8th day, before ulceration had commenced in the intestines. Of 600 patients with enteric fever, Griesinger observed jaundice in 10, of whom several recovered.^l The pathology of the jaundice varies in different cases, as in typhus (p. 210).

6. *Peritonitis* is the complication of enteric fever most to be dreaded. It may result from various causes.

a. The most common cause is perforation of the bowel, to be presently considered.

* TROUSSEAU, 1861.

^f FORGET, 1841, p. 351.

^g LYONS, 1861, p. 252.

^h *Ed. Med. Journ.* August 1862.

ⁱ LOUIS, 1841, Obs. 17 and 26.

^j *Dis. of Liver, Syd. Soc. Transl.* i. 172, 215.

^k JENNER, 1853, p. 312.

^l GRIESINGER, 1864, p. 203.

b. Inflammation may be propagated by continuity from the mucous to the peritoneal coat of the bowel, without any perforation. I have notes of four cases in which no other cause could be found for the peritonitis which was the cause of death. The patients were aged 13, 21, 36, and 50, and death occurred on the 56th, 22nd, 16th, and 35th day of the fever. (Case LXIV.) In this way peritonitis has been known to occur before ulceration has commenced, and even during the first week of the disease.

c. Peritonitis may be excited by softened infarctions in the spleen. This happened in two patients under my care; both were men, one aged 23, and the other 40, and both died during a relapse of the fever. Two similar cases have been recorded by W. Robertson,^m one by Jenner,ⁿ and two by C. E. Hoffmann.^o

d. A fourth cause of peritonitis is the bursting into the peritoneum of a softened mesenteric gland. Jenner records a case of this sort, in which recovery from the peritonitis took place under large doses of opium, the patient dying subsequently of erysipelas of the face.^p

e. An abscess in the wall of the urinary bladder,^q or in the ovary,^r or the bursting inwards of a pseudo-abscess in the sheath of the rectus muscle,^s has been known to be the cause of fatal peritonitis in enteric fever.

f. Lastly, fatal peritonitis may result from ulceration of the gall-bladder, proceeding to perforation. Some years ago, a youth, aged 19, in the London Fever Hospital, was seized with symptoms of peritonitis on the 15th day of enteric fever, and died within twenty-six hours; the cause of the peritonitis was a perforating ulcer of the gall-bladder, which had allowed bile to escape into the peritoneum. Barthéz and Rilliet record a similar occurrence in a girl aged 12;^t and three other cases have been recorded by Hamernjk,^u Archambault^v and Thierfelder.^w In Thierfelder's case the cystic duct was obliterated. G. Budd also relates the case of a female, aged 18, who died of peritonitis on the 36th day of enteric fever; here the peritonitis was excited by suppurative inflammation of the mucous

^m W. ROBERTSON, 1848.

^o HOFFMANN, 1869, p. 203.

^q GRIESINGER, 1864, p. 199.

ⁿ JENNER, 1853, p. 312.

^p JENNER, 1850, xxii. 405.

^r HOFFMANN, 1869, p. 302.

^s ZENKER, 1864, p. 96.

^t BARTHEZ and RILLIET, 1853, ii. 5, 701.

^u HAMERNJK, 1846, p. 58.

^v MORIN, 1869, p. 75.

^ & several by Lendet. (Paris 1874) p. 110

Another case of Perf. of G.B. in Euphorid
recorded by Lendet. - who ^{also} quotes 3 cases
where a circumscribed genital ulcer
resulted from such a perforation, showing
that the inflam. process was slow. - Also
refers to a Hunterian Specimen in the
Mus. of the Land. Coll. Surg. Cat. Vol.
III. p. 90. N^o 1242. Lendet. Clin. Mus.
Paris - 1874 p. 90.

, Another case by M. Lion Colin
Etude de Méd. militaire Paris 1864
p. 197.

membrane of the gall-bladder, but there was no perforation; the gall-bladder contained fourteen gall-stones, one of which completely blocked the cystic duct.* (See *Gall-Bladder*, under *Anatomical Lesions*.)

It is usually impossible during life to distinguish between these different causes of peritonitis; but in the great majority of cases the cause is perforation of the bowel.

CASE LXIV.—*Enteric Fever, fatal on 22nd day from Peritonitis. Sloughing of all coats of Intestine, but no Perforation.*

Elizabeth L.—, aged 21, adm. into L. F. H. July 18th, 1864, having been ill eight days. Her symptoms were general fever, diarrhoea, a copious eruption of lenticular rose spots, and great nervous prostration. On July 27th, or 18th day, she became much worse. Great increase of prostration, and abdomen much distended; vomiting, but no pain or tenderness of abdomen. Pulse 120. Turpentine stupes were applied to abdomen, and opium administered in large and repeated doses, with stimulants. On July 28th, pulse 140; patient had occasional vomiting, and was delirious, and evidently worse. She continued to sink, and died on Aug. 1st.

Autopsy.—Intestines much injected, and coated with recent lymph. Extensive ulceration of lower end of ileum, most of sloughs still adherent. Bases of ulcers, from which sloughs had separated, formed by the denuded transverse muscular fibres. In five or six of Peyer's patches at lower end of bowel the sloughs had extended through the peritoneal coat, but were adherent at their margins, so that contents of bowel had not escaped.

7. *Perforation of the Bowel*, with escape of the intestinal contents into the peritoneum, is the most important and dangerous complication of enteric fever. It occurs in the course of no other *acute* disease, except in comparatively rare cases of dysentery and tuberculosis.

Intestinal perforation is a more common termination of enteric fever than is generally believed, and is apparently more common in England than on the Continent. It occurred in 48 out of 1,580 cases under my care (or in 3·04 per cent.), in 14 out of 600 cases (or 2·3 per cent.) observed by Griesinger,^x and in 2 of 73 cases (2·74 per cent.) observed by Flint^y in America. The frequency with which perforation has been found in autopsies of enteric fever by myself and other observers will appear from the following figures:—

* *Dis. of Liver*, 3rd ed. 1857, p. 195.

^x GRIESINGER, 1864.

^y BARTLETT, 1856, p. 60.

English Observers.

	Autopsies	Perforations	Per Cent.
Murchison, 60 in 325, or 18.46 per cent. ; Bristowe, ^z 15 in 52 ; Jenner, ^a 3 in 23 ; Waters, ^b 2 in 12.	412	80	19.41

French Observers.

Louis, ^c 8 in 55 ; Bretonneau, ^d 8 in 80 ; Chomel, ^e 2 in 42 ; Montault, ^f 5 in 49 ; Forget, ^g 2 in 44.	270	25	9.25
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German Observers.^h

Griesinger, ⁱ 14 in 118 ; collected by Griesinger, 42 in 467 ; Hoffmann, ^j 20 in 250 ; Lebert, 7 in 100 ; Schmieder, Frey, and Hannichus, ^k 8 in 104.	1,039	91	8.75
Total . .	1,721	196	11.38

From the above results it may be inferred that in England, of every 33 persons attacked with enteric fever, one dies of perforation, and that perforation is found in nearly one-fifth of the fatal cases.

Perforation is much more common in males than in females. Of 45 cases which occurred in my practice at the Fever Hospital during the years 1862-9, 32 were males and 13 females. Adding to these 24 cases mentioned in the first edition of this work, and 4 cases which came under my care in the Middlesex Hospital, the total is 73 cases—males 51, and females 22. Yet the number of patients in either sex was almost identical, and the total female mortality was in excess of the male. The greater liability of males to perforation has been confirmed by Griesinger and other observers.

The ages of my 73 patients in whom perforation occurred were as follows. Under 10 years, in 6 ; from 10 to 14, in 8 ; from 15 to 19, in 18 ; from 20 to 24, in 21 ; from 25 to 29, in 6 ; from 30 to 34, in 5 ; from 35 to 39, in 5 ; from 40 to 44, in 2 ; and from 45 to 49, in 2. From this, it appears that age does not much influence the liability to the accident. Perforation is generally stated to be rare in children. Messrs, Barthez, Rilliet, and Taupin¹

^z BRISTOWE, 1860.^a JENNER, 1849 (2).^b WATERS, 1847.^c LOUIS, 1841, ii. 325.^d BRETONNEAU, 1829.^e CHOMEL, 1834.^f MONTAULT, 1838, p. 220.^g FORGET, 1841, p. 330.

^h During ten years (1840-49), Heschl found perforation in only 56 of 1,271 autopsies, or in less than 5 per cent. It may be doubted, however, if he did not include cases of typhus, for the same observer in 1852-53 found perforation in no fewer than 11 of 72 autopsies of 'typhus' (see HESCHL, 1853).

ⁱ GRIESINGER, 1864, p. 197.^j HOFFMANN, 1869, p. 129.^k MORIN, 1869.¹ BARTHEZ and RILLIET, 1853, ii. 701.

For additional statistics see Paul Näcke's
Thesis - Schmidt's Jahrb. 1875. Bd. 165-
p. 88.

+ May - 1875

Dr. Goodridge writes to say that the date
of attack in his case "was well ascertained
relevant to the hour."

met with it in only 3 of 232 children under treatment; still, of fatal cases, as large a proportion seems to be due to perforation in children as in adults. One patient under my care died of perforation at the age of 5. Doubts have been expressed as to whether perforation ever occurs in persons over 40; and Hoffmann dissected 38 such cases without encountering perforation once; but 4 of my patients were between 40 and 50.

Among the circumstances which favour the occurrence of perforation may be mentioned indigestible food, distension of the ulcerated bowel with gas or fæces, vomiting, and movements on the part of the patient. Morin relates an instructive case in which perforation resulted from the administration of an enema; many instances might be quoted where it has been produced by the injudicious administration of a purgative, and one of Thierfelder's patients was seized with peritonitis the moment she sat up in bed to take some soup.

Perforation is most likely to happen during the third, fourth, or fifth week of the disease. In 58 of my cases the date of its occurrence was determined as follows:—During second week, 4 cases; during third, 13; during fourth, 16; during fifth, 13; during sixth, 8; during eighth, 1; during ninth, 1; and during tenth, 1. Peacock mentions a case where it happened on the eighth day;^m in one case at the Fever Hospital it occurred on the ninth day; in a case related by Goodridge, on the eleventh;ⁿ and in one of Louis's cases on the twelfth day. On the other hand, in 2 of my cases, perforation did not occur until about the 66th day, while in 3 cases referred to by Morin, the date of its occurrence is said to have been the 72nd, 76th, and 110th day.^o The liability to perforation, long after convalescence has fairly commenced, is a point which cannot be too strongly insisted upon. Some years ago a man came under my care suffering from acute peritonitis, with which he had been seized while at work as a labourer, and which proved fatal in a few hours. On examining his body, cicatrizing typhoid ulcers were found in the ileum, but one had advanced to perforation. About six weeks before the man had been seized with a mild attack of enteric fever, but he had been quite convalescent for a fortnight. In several other instances I have known perforation occur after the patient had got up, and was apparently doing well. (Cases LXVIII. and LXIX.)

^m PEACOCK, 1856 (No. 1).

ⁿ *Lancet*, March 11, 1865. In reference to these cases the difficulty of fixing the date of attack must be remembered.

^o MORIN, 1869, p. 47.

Tweedie also observes that he has known it happen when convalescence was supposed to be progressing so surely and satisfactorily, that the patient had been allowed to leave the house, and the stools had been formed and perfectly healthy in appearance.^p

9 In a large proportion of cases of perforation, the previous symptoms are severe, and diarrhoea, as might be expected, is a prominent symptom. This was the case in 60 out of 69 of my patients; ~~and~~ in 11 of the 60, the symptoms of peritonitis were preceded by considerable intestinal hæmorrhage, and in many there was an unusual amount of abdominal pain. On the other hand, it is a fact which cannot be too strongly insisted on that perforation may occur in cases of the mildest description, and in which the bowels have been throughout confined. In 9 of my 69 cases there had been constipation up to the occurrence of perforation, and in 5 of the 9 cases the general symptoms had been very mild. (Cases LXVII., LXIX.) I have known a man walk more than a mile to the London Fever Hospital at the end of the third week of the fever, and die of perforation within thirty hours of admission. Another of my patients was seized with perforation while digging. (Case LXVIII). Louis relates the case of a man who walked daily in the hospital garden up to the 23rd day, when perforation occurred, which was followed by death in 36 hours.^q Two similar cases occurred in Guy's Hospital some years ago.^r Most writers agree in stating that perforation is chiefly met with in these *latent* cases, and this opinion, founded mainly on the experience of Louis and Chomel, who found the disease latent prior to perforation in 10 out of 12 cases,^s was expressed in the first edition of this work. The data now published show that this opinion is erroneous.

The occurrence of perforation is denoted by the sudden supervention of collapse, with or without rigors, but with acute pain and tenderness of the abdomen, which at the same time is tense and tympanitic. Vomiting is common, and often precedes the other symptoms for several days, and is then often accompanied by an increase of diarrhoea,^t with or without intestinal hæmorrhage. The decubitus is dorsal, with the legs drawn up; the temperature rises;^u the pulse is rapid, thready,

^p TWEEDIE, 1862, p. 75.

^q LOUIS, 1841, ii. 223.

^r HABERSHON, in *Trans. Med. Soc. of Lond.* 1862, ii. 120.

^s CHOMEL, 1834.

^t After perforation has occurred, the diarrhoea does not always cease, as has been stated.

^u When the collapse is very sudden and profound, there may be a considerable fall of temperature; but the rule is that the temperature rises.

or imperceptible; the breathing is thoracic; the countenance pale, pinched, and expressive of suffering; and there is great thirst, and often suppression of urine. Soon the prostration becomes extreme, the extremities cold, and the face covered with large drops of perspiration; and the patient gradually sinks, the mind remaining clear to the last. With such symptoms, the diagnosis of peritonitis can never be a matter of doubt. But occasionally the symptoms are more obscure, and probably many patients die of peritonitis, where its existence has not been suspected. (Cases LXV. and LXXII.) In fully one-fourth of my cases of perforation there was neither pain nor rigors, and the chief indications of its occurrence consisted in a sudden increase of prostration, a rise in the pulse and temperature, and a distended, motionless state of the abdomen. The advent of perforation may likewise be latent, in consequence of the patient being delirious or unconscious; the prostration being accounted for by the severity of the fever, and the ordinary symptoms of peritonitis being absent. Jenner reports a case where the only symptoms were vomiting and coldness of the extremities, coming on eight hours before death;^v and in 3 out of Louis's 8 cases, the symptoms were obscure.

The occurrence of perforation is sometimes followed by death within a few hours, and life is rarely prolonged beyond two days. Of 65 cases in which I have noted the circumstance, only 9 survived the commencement of peritoneal symptoms more than 4 days; 47 died within 48 hours; 30 within 24 hours; and 14 in less than 12 hours;^w one of my patients, however, lived 12 days, and another 15 days. (Case LXXIII.) In one of Bristowe's cases there was an interval of upwards of a fortnight between the first symptoms of perforation and the fatal result.

Most observers, including Louis, Chomel, Rokitansky, and Jenner,^x have expressed the opinion that perforation in enteric fever is invariably fatal. Still, it is satisfactory to know that rare cases are met with, where recovery ensues after all the symptoms of peritonitis from perforation. Tweedie states that he has witnessed the recovery of two cases, in which the distinctive signs of perforation had been unequivocal, and a

and a third 21 days.

^v JENNER, 1850, xxii. 298.

^w According to Griesinger, death rarely occurs within the first 24 hours, but usually from the 2nd to the 4th day, and in many cases not till the 7th or even 10th day.

^x JENNER, 1853, p. 286.

similar case occurred in the practice of the late Dr. Todd. Other cases of recovery have been recorded by E. L. Fox,⁷ Ballard,² Joseph Bell,^a Bristowe,^b Griesinger,^c Buhl, Thierfelder,^d and Morin.^e Six cases have come under my own observation of which a brief summary is appended. (Cases LXXV. to LXXX.) Cases in which recovery has been thought to follow perforation are, of course, open to the objection that the peritonitis may have resulted from some of the causes, other than perforation, already referred to. At the same time, on pathological grounds, there appears to be no reason why recovery should not occasionally take place. On several occasions I have found a minute perforation with its edges glued to the abdominal parietes, or to an adjoining coil of bowel, in such a way that little or no escape of the intestinal contents had taken place, and where, in fact, a process of cure appeared to be commencing, which, it is legitimate to infer, might in other cases be completed. Facts are not wanting to confirm this inference. Buhl, for example, relates the case of a patient who got symptoms of perforation on the 25th day of enteric fever, and was recovering, but died twenty days afterwards of profuse hæmorrhage; a perforation was found completely closed by adhesions to the mesentery.^f But even when the opening is large enough to permit a leakage of some of the intestinal contents, the peritonitis may be limited by adhesions, so that a circumscribed peritoneal abscess results, and then a long period may intervene between the occurrence of perforation, and the fatal event, which may be due to septicæmia, or recovery is not impossible. In three instances I have known a patient recover after such an accident, the abscess in two of the cases discharging itself by the bowel (Cases LXXVIII. and LXXIX.), and in the third opening externally. (Case LXXX.) Cases similar to the last have been observed by E. L. Fox,⁸ Thierfelder,^h and Jenner;ⁱ and Bristowe has recorded the case of a girl who had a circumscribed suppurative peritonitis resulting from perforation of the bowel in enteric fever, from which she recovered after paracentesis.^j In another patient, under the care of Griesinger, perforation occurred at the end of the 6th week of enteric fever; from this she was evidently recovering;

⁷ *Brit. Med. Journ.* June 8th, 1861.

² *Lancet*, 1860, i. 422.

^a BELL, 1860, viii. 388.

^b BRISTOWE, 1860, p. 115.

^c GRIESINGER, 1864.

^d THIERFELDER, 1855.

^e MORIN, 1869.

^f Cited by MORIN, 1869, p. 70.

⁸ *Brit. Med. Journ.* 1861, i. 602.

^h THIERFELDER, 1855.

ⁱ *Lancet*, 1869, i. 9.

^j BRISTOWE, 1860, p. 115.

Care of "Perfor." recovered from. proved
by subsequent p.m. Dr. Macleod. Kil
marnoch. Dr. W. J. G. May. 1875-

but nine days after, she turned from her back on her side, and at once the symptoms of acute peritonitis returned, and ended in death within seventeen hours. A small abscess was found in connexion with a perforated bowel, containing fæcal matter and circumscribed by adhesions, some of which had been torn by the girl changing her position.^k Buhl speaks of a similar case, where recovery was maintained for five weeks before the fatal catastrophe.¹ From the above evidence, it follows that recovery does, in rare cases, follow perforation of the bowel in enteric fever.

CASE LXV. *Enteric Fever. Acute Delirium. Profuse Intestinal Hæmorrhage, and Death on 19th day. No Symptom of Peritonitis. Autopsy:—Ulceration of Intestines; Perforation; Peritonitis.*

James L——, aged 19, adm. into L. F. Hosp. on *Aug. 19th*, 1858, having been ill eight days. Bowels had been much relaxed, and for two days he had been very delirious.

Aug. 20th (10th day). Pulse 120, full, but compressible. Slight headache; rather confused. Was very delirious in night, and attempted to leave bed. Several rose spots on chest and abdomen. Tongue moist and furred, red at edges; intense thirst; great tympanitis and tenderness in right iliac fossa; two light watery stools. *Aug. 21st (11th day).* Pulse 132. Is more prostrate, and was again very restless and delirious in night. Skin hot and dry; temperature in axilla 104° Fahr. Lenticular spots more numerous; tongue dry along centre, red at edges; abdominal tenderness increased; five watery motions. Was ordered turpentine stupe to abdomen; acetate of lead (gr. iij.) every four hours; starch and laudanum enema at night, and 4 ounces of brandy. *Aug. 24th (14th day).* Pulse 144, weak. Is now unable to get out of bed, but still tries to do so when he is delirious at night. Is confused, but understands what is said to him; pupils natural; circumscribed flush on both cheeks; numerous rose spots; fresh ones appear daily. Tongue red and moist; great tympanitis; two watery stools. Since *Aug. 22nd*, patient has been taking ammonia and chloric ether, instead of the lead, and he has had a morphia draught at night. To-day, brandy was increased to 8 ounces. *Aug. 26th (16th day).* Pulse 136. Scarcely knows friends; moans and sighs very much; but always calls for bed-pan when he requires it. Spots continue; skin is moist, and has perspired every night since admission, after which he has been very faint. Two stools. *Aug. 27th (17th day).* Had no motion since yesterday till this afternoon, when he passed a large quantity of fetid, liquid, red blood. No vomiting, and tenderness of abdomen seems less than before; but patient is scarcely conscious. Was ordered a starch enema with 20

^k GRIESINGER, 1864, p. 198.

¹ Cited by MORIN, 1869, p. 71.

drops of laudanum, and a draught with 15 minims of turpentine every three hours. Aug. 28th (18th day). No motion for some hours after enema, but since then he has had five, of pure blood. Tongue dry and brown; sordes on teeth; slight tenderness of abdomen. Pulse 136, small and weak; very noisy in night, and scarcely knows father; but got up to stool himself, when nurse was not present. Aug. 29th (19th day). Died at 7½ A.M. Was very restless and delirious until half an hour before his death. Passed one bloody motion in bed, in night.

Autopsy, 35 hours after death. Heart 10 ounces; permanent foramen ovale; small white coagulum in right ventricle. Abdominal cavity

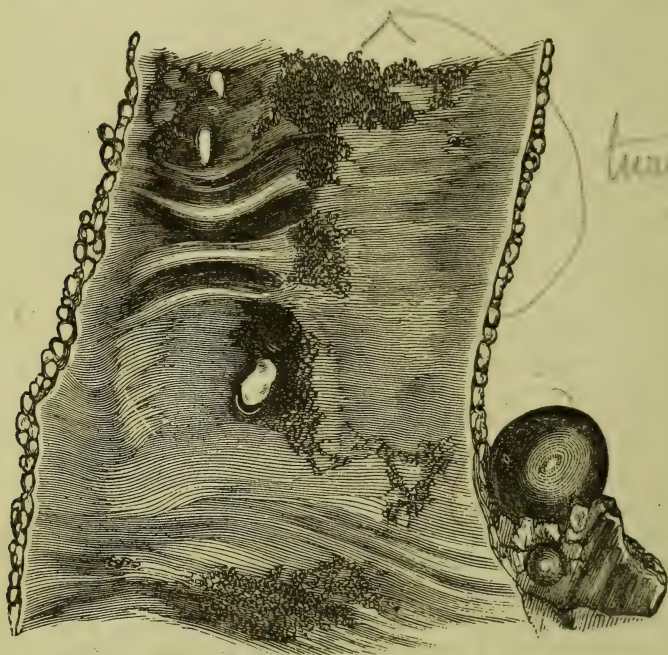


Fig. 15. Perforation of ileum, seen from peritoneal surface. *a.* Enlarged mesenteric gland. *b.* Dead portion of peritoneum, surrounded by increased vascularity: at its lower end is the perforation. *c.* Flakes of lymph. *The preparation is in the museum of Middlesex Hospital.*

contained about half a pint of dirty yellow faecal fluid. The peritoneal surface of small intestines very vascular, and coated with loosely adherent flakes of lymph. Twelve inches above ileo-colic valve was a semilunar perforation, measuring 2 lines in long diameter, and formed in this way:—An oval patch of peritoneum, measuring 4½ lines by 2 lines, had sloughed, its smooth pale yellow surface contrasting strongly with the surrounding bright red membrane roughened by deposit of lymph. This slough still adhered by its edges, except at one extremity, where it was detached, forming the semilunar perforation (see fig. 15). The little opening was plugged by a fragment of slough from interior of bowel. On slitting open intestine, lower four inches

of ileum were found to be one mass of ulceration, which terminated abruptly at valve. This ulcerated surface was covered with loosely attached yellowish sloughs, and with masses of coagulated blood. Six of Peyer's patches and many of solitary glands above this were ulcerated, yellowish sloughs being still loosely attached to most of ulcers. In one of Peyer's patches was the perforation already described. Some of solitary glands were enlarged from morbid deposit, up to size of a split-pea, but were not ulcerated. Many of solitary glands in cæcum and ascending colon were either ulcerated or contained morbid deposit. Large intestine contained a few ounces of blood. Mesenteric glands were much enlarged, some near cæcum being as large as a pigeon's egg. Liver 60 ounces, anæmic, but healthy; 12 drachms of very pale, watery bile in gall-bladder. Spleen, 9 ounces, dark, and rather firm. Kidneys large, and very congested; right, $6\frac{1}{2}$ ounces; left, 5 ounces.

CASE LXVI. *Enteric Fever of moderate Severity. After temporary Improvement, Peritonitis and Stercoraceous Vomiting on 23rd day, and Death within 36 hours. Autopsy:—Ulceration of Intestines. Perforation and Peritonitis.*

Thomas P——, aged 21, was adm. into L. F. Hosp. Sept. 15th, 1858. He began to complain of giddiness, headache, and pains in limbs on Sept. 1st, and almost from first, bowels had been much relaxed.

Sept. 15th. Pulse 108. No headache. Intelligence clear; pupils dilated. Several rose spots on chest and abdomen. Temperature under tongue 104° Fahr. Tongue red; abdomen tympanitic; bowels still relaxed. Was ordered acetate of lead (gr. iij.) after each motion of bowels. Sept. 16th (16th day). Pulse 92. More prostrate, but can get up without assistance; restless at night, and mutters in sleep; but intelligence is clear, when awake. Tongue dry and brown along centre; 4 light, watery stools. Ordered 6 ounces of wine. For next four days patient continued much in same state, except that on Sept. 18th he became a little drowsy. His intelligence always seemed clear when he was spoken to; pupils were always dilated; fresh spots continue to appear daily in large numbers; bowels were moved two or three times daily, and pulse never exceeded 96. Sept. 20th. Pulse 120, but patient feels much better. Three motions. Sept. 21st (21st day). Pulse 88. Intelligence clear, but is more drowsy. Temp. under tongue only 102° Fahr.; 105 rose spots counted on front of chest and abdomen. Lips parched; tongue dry, red, smooth, and deeply fissured; less tympanitis, and scarcely any tenderness of abdomen; three stools. Appearance much improved. Sept. 23rd (23rd day). Pulse 120, and weaker, and does not feel quite so well. Slept well, but is a little confused; pupils dilated; 21 fresh spots on front of chest and abdomen, and many of old ones gone. Only two stools, which are of more consistence. Ordered 6 ounces of brandy. At 6 P.M. urgent diarrhoea came on; and in night he was seized with

acute pain in abdomen, followed by vomiting. *Sept. 24th.* Pulse 108, very weak; features pinched; very prostrate, but is perfectly conscious. One stool since midnight, passed in bed. The vomited matters exactly resemble the fæces, both in smell and colour; abdomen tense, and very tender; spots numerous. A starch and laudanum enema was administered, and a grain of opium was ordered every second hour. Diarrhœa and vomiting continued, and at 8 A.M. of 25th, patient died, his mind remaining clear to last.

Autopsy, 8 hours after death—Cadaveric rigidity marked. None of lenticular spots visible, although their situation was indicated by circles of ink. Both lungs healthy; right, 16 oz.; left, 16½ oz. Abdomen contained about a pint and a half of opaque yellowish fluid, containing flakes of lymph, but apparently not fæcal. The whole of intestines were glued together by recent lymph, which also coated surface of liver and under-surface of diaphragm. Peritoneal surface of intestines intensely injected, especially over lower six feet of ileum. The portions corresponding to Peyer's patches were particularly bright, and here also lymph was more adherent than elsewhere. An ulcer was found in almost every one of Peyer's patches in the lower four feet of ileum. The sloughs had separated from all of them, and in several the floor was formed by transverse muscular fibres, or by peritoneum; in one, 5½ inches above valve, was a small circular perforation, barely large enough to admit a stocking wire. The peritoneal edges of this perforation were glued by lymph to a neighbouring coil of bowel, so that contents of bowel had been prevented escaping in any quantity. None of solitary glands in large intestine, and but few in ileum, showed any trace of disease. Mesenteric glands enlarged; but none larger than a hazel-nut. Spleen 14 ounces, dark and rather soft. Liver 73 ounces, fatty; one ounce of pea-green bile in gall-bladder. Kidneys enlarged; each 6 ounces; hyperæmic.

CASE LXVII. *Enteric Fever running a mild course up to occurrence of fatal Peritonitis about 16th day.*

Thomas K—, aged 17, admitted into Middlesex Hospital under my care *Oct. 14th, 1870*, and died within 24 hours. He had all the symptoms of acute peritonitis, viz.:—features pinched, cold clammy sweat, pulse 140, respiration 56 and thoracic; abdomen distended, tender and motionless, and legs drawn up; frequent vomiting, and scanty urine.

The boy's mother stated that he had followed his work till *Oct. 7th*, although for ten days before he had complained of being 'out of sorts.' He had no diarrhœa, and so little was it thought that he was seriously ill, that he continued going about until afternoon of day preceding admission, when he was obliged to go to bed on account of a sudden seizure of acute pain in abdomen.

Autopsy.—Numerous 'typhoid ulcers' in ileum, many of sloughs still attached. One Peyer's patch, 12 inches above valve, had sloughed

out bodily, leaving an opening in the gut, through which the finger could be passed. Contents of bowel had escaped into peritoneum, and there were all the signs of extensive recent peritonitis.

CASE LXVIII. *Latent Enteric Fever. Perforation of Bowel after apparent Convalescence, about 30th day.*

John B—, aged 43, adm. into L. F. H. Oct. 20th, 1865, with all the symptoms of acute peritonitis. He stated that four days before, while at work as a labourer, he had been suddenly seized with acute pain in the abdomen, and that since then his bowels had not acted. He was extremely prostrate; extremities cold; pulse 120, counted with difficulty; respirations 48, thoracic; lower part of abdomen much distended, tympanitic and tender; and here, on tapping, there was a distinct thrill, as from a thin film of fluid. No eruption; urine contained albumen. A few hours after admission, an attack of urgent vomiting set in, which terminated in death.

Autopsy.—Extensive recent peritonitis; nearly a pint of purulent fluid confined to lower part of abdominal cavity by adhesions of great omentum. Numerous typhoid ulcers, mostly cicatrizing, in ileum, in one of which, three inches above the valve, was a perforation two lines in diameter.

After patient's death it was ascertained that he had been ill with 'fever' for three or four weeks, but that four days before admission he had been told by his medical attendant that he was well enough to return to work, and that he had been working for several hours before he was seized with the acute pain above referred to.

CASE LXIX. *Enteric Fever. Death from Perforation and Peritonitis on 42nd day, after apparent Convalescence. The occurrence of Perforation preceded by Constipation. Solid fæces in perforated Bowel.*

William S—, aged 14, adm. into L. F. H. on July 4th, 1864; ill ten days, and in bed four days. His symptoms were fever, diarrhœa, dry brown tongue, sordes, rose spots, delirium and subsultus. On July 21st (27th day) he appeared convalescent, and from this date he continued to gain strength and was able to walk about; but on Aug. 2nd (39th day) he had pain in stomach relieved by pressure, and on following day pulse rose to 124, belly became very distended and tender, features were pinched, breathing thoracic, and there was general collapse. It is worthy of notice that bowels had been constipated for several days, and that on this (40th) day a solid motion was passed. On Aug. 4th pulse was 132, and there was retching. On morning he died.

Autopsy.—Peritoneum contained several pints of opaque ochrey fluid. Intestines glued together by recent lymph, and the peritonitis extended over upper surface of the liver. In ileum, immediately above valve, extensive ulcers, almost cicatrized; but $2\frac{1}{2}$ feet above

valve was an ulcer, in centre of which was a circular perforation one line and a-half in diameter. The surrounding peritoneum was plastered with recent lymph. Solid fæces were found in ileum. Mesenteric glands scarcely enlarged. Spleen weighed only 4 ounces, and seemed healthy.

CASE LXX. *Enteric Fever. Convalescence. Relapse. Death by Perforation on 49th day.*

William W—, aged 24, adm. into L. F. H. Aug. 29th, 1864, on 15th day of an attack of enteric fever. His symptoms after admission were pyrexia, with numerous rose spots; tongue dry, red, and cracked; abdomen distended; diarrhoea with moderate hæmorrhage; mind confused; general bronchitis, and pneumonia of base of right lung. On Sept. 16th (33rd day) he was quite convalescent, and he continued to improve until Sept. 26th, when there was a return of pyrexia and diarrhoea. On Sept. 30th fresh rose spots appeared. At 11 P.M. of Oct. 1st symptoms of acute peritonitis suddenly supervened, which after 29 hours terminated in death.

Autopsy.—General peritonitis. A pint of fæculent fluid in peritoneum. Two large oval perforations in ileum, one 15 inches above the valve measuring $\frac{1}{2}$ by $\frac{1}{3}$ inch, and the second $2\frac{1}{2}$ feet above the valve measuring $\frac{2}{3}$ by $\frac{1}{3}$ inch. Close to the valve was extensive ulceration in process of cicatrization. Above this were numerous ulcers whose base was formed by the transverse muscular fibres of the bowel, and still higher up, commencing about 3 feet above the valve, and extending upwards for several inches, the solitary glands were distended with opaque yellow material of recent date. Spleen 14 oz., and firm.^m

CASE LXXI. *Enteric Fever of about 5 weeks' duration. Sloughing through entire coats of Bowel. No Peritonitis.*

Thomas W—, aged 32, adm. into L. F. H. Aug. 27th, 1864, having been ill for about a month. His symptoms were quick, feeble pulse, successive crops of lenticular spots, dry tongue, diarrhoea, low delirium, and rapidly increasing prostration until death, on Sept. 7th.

Autopsy.—Body extremely emaciated. No trace of peritonitis. Numerous ulcers in ileum, for about 3 feet above valve. Most of ulcers were clean, with no adherent sloughs, and with margins formed by loose fringes of mucous membrane, and bases exhibiting denuded transverse muscular fibres. About $2\frac{1}{2}$ feet above valve, bases of ulcers had sloughed through to peritoneal surface. The sloughs came away in washing bowel, leaving two large oval holes, about size of a vegetable-marrow seed. The absence of any peritonitis showed that no detachment had taken place during life.

^m A case similar to this is recorded by me in the *Path. Trans.* vol. xvi. p. 144.

In this case also the recent lesions were higher up in the bowel than those of the first attack.

CASE LXXII.—*Enteric Fever. Profuse intestinal Hæmorrhage. Perforation of Appendix vermiformis about 28th day.*

Mary Ann B—, aged 13, adm. into L. F. H. *Sept. 11th*, 1865. She was confused, and could not say how long she had been ill. Skin hot; several typical rose spots on abdomen; pulse 120, small and feeble; tongue moist and brown in centre; bowels loose; abdomen tender and tympanitic. Until *Sept. 16th* fresh spots were noted daily, but from that date they faded. For five days after *Sept. 14th* she obstinately refused to take drinks, and was supported by injections of beef-tea and brandy. The tongue became dry and rough; the pulse ranged from 120 to 144; cough set in on *Sept. 16th*, and moist râles were heard over the lungs; the abdomen continued tense and tender, and the diarrhœa persisted. The motions were ochrey and free from blood, but in the night of *Sept. 23rd* there were four very copious motions consisting almost entirely of pure blood. The hæmorrhage was checked by large doses of gallic acid and opium; but although for four days previously her general condition had improved, and hopes had been held of her recovery, she rapidly sank after the bleeding, and died on *Sept. 25th*.

Autopsy.—Patches of recent lymph over surface of intestines, especially in vicinity of cæcum. Inside vermiform appendix were four ulcers, in one of which, about three-quarters of an inch from the distal end, were two small perforations; the contents of the bowel had not escaped into the peritoneal cavity. Extensive ulcers in the ileum, and a few in the cæcum near the valve; the sloughs had separated from most of the ulcers, which were beginning to heal. The source of hæmorrhage was not determined. Recent pneumonic consolidation in lower lobe of both lungs. #

CASE LXXIII. *Enteric Fever, fatal about 30th day. Symptoms of Peritonitis a fortnight before death. Three Perforations in large intestine.*

John S—, aged 19, adm. into L. F. H. on *Aug. 23rd*, 1865. He had been ill for 14 days at least, and on admission had all the symptoms of severe enteric fever with peritonitis. Skin hot and moist; numerous rose spots over trunk. Pulse 120, small and feeble. Tongue dry, cracked, and covered with sordes. Abdomen enormously distended, tympanitic and tender; motions frequent and watery. Breathing entirely thoracic. Bed-sore over sacrum. The rose spots were not seen after *Aug. 25th*. The greatly distended and tympanitic state of abdomen continued throughout; and on 31st an uneven, nodulated appearance was noticed, which continued till his death, and seemed as if intestines adhered to abdominal parietes. In spite of all treatment, diarrhœa continued profuse; but no blood was passed, except small quantities in motions of *Aug. 29th*, and *Sept. 2nd* and *3rd*. Mind was heavy and confused from first; but he was always ready to take drinks, and could answer questions till day he died. Pulse varied

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from 100 to 140, but was usually about 120, and always very small and feeble. The bed-sore extended and caused much pain. After *Sept. 1st* evacuations were passed involuntarily. He died on *Sept. 7th*.

Autopsy.—Whole surface of peritoneum coated with a thin layer of lymph. Numerous small ulcers in large intestine, three of which had proceeded to perforation, one about $3\frac{1}{2}$ inches from ileo-colic valve, and two in sigmoid flexure. The contents of bowel had not escaped in any quantity into peritoneal cavity. Extensive atonic ulcers in ileum; their margins formed by loose fringes of mucous membrane; but in none was there any perforation. Lobular pneumonia of both lungs.

CASE LXXIV. *Enteric Fever. Convalescence. Relapse. Perforation of Colon on 73rd day. Adhesion of perforated bowel to gall-bladder. Death on 94th day.*

Samuel W——, aged 48, was taken ill about *Feb. 5th*, 1872, and on *Feb. 13th* adm. into L. F. H. where he remained till *March 5th*, when he was discharged convalescent. Among the symptoms noted in the Fever Hospital were a dry red tongue, distended abdomen, diarrhoea, delirium and rose spots. On *March 23rd* (48th day) he was again seized with pyrexia and diarrhoea, and on *April 3rd* (59th day) he was admitted into St. Thomas's Hospital under my care. He was then very prostrate and emaciated; tongue dry and brown; much delirium; obstinate diarrhoea, and tenderness over cæcum. After a few days the fever subsided and the general symptoms improved; but there was no marked convalescence, and on *April 18th* (74th day) he was suddenly seized with acute pain at the epigastrium, rapid thoracic breathing, and collapse. He had frequent recurrences of these attacks, the hepatic region became very tender, and the patient lapsed again into a low typhoid condition, but had no rigors or night sweats. He died on *May 8th* (94th day), and for several days before death the extremities were cold and livid, and the temperature subnormal (94° Fahr.).

Autopsy.—Numerous 'typhoid ulcers' for the most part cicatrized in lower part of ileum. Recent perihepatitis over upper surface of liver. Hepatic flexure of colon adherent to fundus of gall-bladder, an abscess of about the size of a cherry intervening; the corresponding mucous surface of the gall-bladder intact, but that of the colon ulcerated, and had apparently been at one time the seat of a perforation communicating with the abscess.

CASE LXXV. *Enteric Fever. Acute Peritonitis on 31st day. Recovery.*

In 1858, a girl, aged 15, was under my care in the Fever Hosp. suffering from enteric fever. On the 31st day of her illness she was suddenly seized with acute pain and distension of the abdomen, thoracic breathing, urgent vomiting and collapse. One grain of opium was ordered every second hour, and ten grains were taken during the first

36 hours. The patient made a tedious recovery, and was discharged from the Fever Hospital 55 days after the commencement of the peritonitis.

CASE LXXVI. *Enteric Fever. Acute Peritonitis on 39th day.
Recovery.*

On Sept. 27th, 1867, Isabella E—, was admitted into the Fever Hosp. on the 15th day of an attack of enteric fever. On the 39th day, when apparently convalescing, and after having eaten fish for a week, she was suddenly seized with acute abdominal pain, which became greatly distended, motionless, and very tender; pulse 132; frequent vomiting. She was treated with opium, and at first took a grain every two hours. The symptoms of peritonitis did not subside for a fortnight, but the patient recovered, and left the hospital on Jan. 7th, 1868.

CASE LXXVII. *Enteric Fever. Acute Peritonitis on 35th day.
Recovery.*

Ann P—, aged 29, came under my care at the Middlesex Hospital on Nov. 25th, 1870, about the 14th day of a very severe attack of enteric fever. About the 35th day symptoms of peritonitis came on; pulse 156, legs drawn up, great distension and exquisite tenderness of abdomen, thoracic breathing, occasional retching, temperature 105.4° Fahr. These symptoms lasted five or six days, when the temperature fell and the other symptoms began to improve. The patient left the hospital on Feb. 13th, 1871. The treatment in this case also consisted in grain doses of opium every 3 or 4 hours.

CASE LXXVIII. *Enteric Fever. Acute Peritonitis on 18th day.
Peritoneal Abscess opening into Bowel.*

Rose T—, aged 25, was admitted into the Fever Hosp. Nov. 10th, 1865, suffering from enteric fever. On the 18th day of her illness she was seized with acute pain in abdomen, which was greatly distended, tense, tender, and motionless, and with these symptoms there was extreme prostration. Opium was prescribed. On the 29th day a painful swelling appeared in the right iliac region. This increased in size till the 47th day, when fresh, though less severe, peritoneal symptoms came on, and lasted off and on till the 73rd day, when the patient passed a large quantity of pus and blood per anum, and the swelling disappeared. The patient recovered and was able to leave the hospital at the end of January 1866.

CASE LXXIX. *Enteric Fever. Acute Peritonitis. Peritoneal
Abscess opening into Bowel.*

Mary S—, aged 32, was admitted into the Middlesex Hosp. under the care of Dr. H. Thompson, on Oct. 14th, 1861, suffering from

enteric fever, in the course of which she was seized with symptoms of acute peritonitis, followed by the formation of a large abscess in the lower part of the abdomen. After several months a large quantity of pus was discharged per anum, and the patient slowly recovered, but altogether she was confined to bed for nine months.

CASE LXXX. *Enteric Fever. Peritonitis in fourth week. Circumscribed peritoneal Abscess opening externally*

Patrick G—, aged 11, was admitted into the Fever Hosp. on Nov. 18th, 1867, having been ill for about three weeks with a severe attack of enteric fever. On Nov. 23rd he was seized with acute pain in abdomen, which was greatly distended and tender; vomiting; thoracic breathing; pulse 132, and thready. Opium was given freely, and after four days the urgency of the symptoms subsided, and the patient began to improve. About the end of December the patient called attention to a painful swelling above the crest of the left ilium,^a which continued to enlarge until he was removed by his friends on April 26th, 1868, when the swelling had all the characters of a large abscess. On Jan. 11th, 1870, was again brought to the hospital, suffering from typhus, from which he also recovered. He had then a fistulous opening discharging thin pus in the left lumbar region, and the cicatrix of another opening in front of the anterior spine of the left ilium. The abscess had not opened until six months after his leaving the hospital in 1868; the first opening had been the anterior one, and the discharge of pus had been enormous.

f. *Diseases of the Urinary Organs.* (See p. 211).

1. *Disease of the Kidneys* is always a very serious complication of enteric fever. (See pp. 211, 532, and *Anatomical Lesions*).

2. *Hæmaturia.* (See p. 1).

3. *Catarrh of the Bladder* may be troublesome in convalescence in cases where retention has been neglected during the fever.

g. *Complications referable to Organs of Generation.*
(See p. 212.)

1. *The Catamenia* often occur during the febrile attack, and are sometimes profuse.

2. *Pregnancy.* According to Rokitansky,^o and Niemeyer,^p pregnancy confers almost entire immunity from enteric fever; but the correctness of this opinion has been denied by Forget,

^a In Thierfelder's case also the abscess was on the left side.

^o *Path. Anat. Syd. Soc. Transl.* ii. 82.

^p *Text Book of Pract. Med., Amer. Trans.* ii. 574.

See also case of Mr. Britten, Surgeon at Guilford
Sept. 21/70.

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Psychosis - usually slight - occasional
recurs. Hunter's Case - 1876

3. Inflammation & Swelling of Mammary

Several cases recorded by Lendeb. (Chirurgie
Paris, 1874, p. 113) - Now preceded by
extensive hemorrhage & by epistaxis
Usually indolent without suppuration
Involvement general or confined to
certain lobules - painful - appears
in advanced stage -

Jenner,¹ Griesinger,² &c., and I have met with many instances of pregnant females attacked by the disease. Pregnancy is a less formidable complication than is commonly imagined, or than it was stated to be in the first edition of this work, nor does abortion or miscarriage necessarily take place. I have notes of 14 cases: 10 recovered; 2 of the 10 carried the child (at the fourth and eighth month) throughout the attack; in 8 of the 10 abortion or miscarriage took place between the fourth and eighth month, and 1 woman in her eighth month was delivered of a living child: 4 of the patients died; all 4 miscarried, 3 in the seventh month, and in the fourth the duration of pregnancy was not noted; abortion or miscarriage occurred in the second week of the fever in 2 cases; in the third, in 1; in the fourth, in 6; in the fifth, in 2; and in a relapse, in 1.

h. Diseases of the Supporting Tissues, Integuments, Bones, &c. (See p. 212).

1. *Erysipelas*, mostly of the face, was noted by Louis in 9 of 134 cases; by Chomel in 4 of 42 fatal cases; and by Jenner in 7 of 23 fatal cases; but it did not occur in 1 per cent. of my cases. It usually appears in an advanced stage of the disease, is sometimes associated with otorrhœa, and is often fatal; 6 of Louis's 9 cases died, and 4 of 9 cases observed by myself. (See p. 212).

2. *Anasarca*. Local œdema may result from venous thrombosis (see p. 559); and œdema of both lower extremities from weakness of circulation is occasionally observed during convalescence from protracted attacks. Leudet has published an account of seven remarkable instances of enteric fever, observed at Rouen, in which the inferior extremities and the entire body became very œdematous in the second or third week of the fever, or during convalescence. All but one, who died of peritonitis, recovered; none had albuminous urine. The swelling was unattended by pain, but was ushered in by severe bronchitis and profuse sweating. After lasting for two or three weeks it disappeared, and it gave rise to no inconvenience, except that it retarded convalescence. The cause of the dropsy was believed to be the adynamic constitution of the persons attacked.³ Similar cases were observed at Tübingen by Griesinger in persons who had been very destitute prior to their

¹ JENNER, 1850, xxii. 439.

² GRIESINGER, 1864, p. 229.

³ LEUDET, 1858.

attack of fever.^t Barthez and Rilliet also speak of general or partial anasarca as a not uncommon sequela of enteric fever in children; it occurred in 7 out of 111 cases which they analysed, In 2 other of their cases, extreme general anasarca came on as early as the fifth day of the fever and lasted eight or ten days; there was no albumen in the urine, and after the disappearance of the œdema the fever ran its usual course; both children recovered.^u

3. *Gangrene from Pressure.* It has been a common observation that bed-sores are more common in enteric fever than in typhus, and the fact is readily accounted for by the greater emaciation in the former malady, and its longer duration. I have seen them not only over the sacrum and trochanters, but at the elbows, heels, and occiput.

4. *Spontaneous Gangrene* (See p. 559).

5. *Noma or Cancrum Oris* is a rare complication of enteric fever, and only occurs in children. I have met with it only once, and it occurred in only 1 of 600 cases observed by Griesinger.^v Two cases are mentioned by West;^w and of 98 cases of gangrene of the mouth observed by Tourdes, 7 followed on enteric fever.^x It is usually fatal. (See p. 214.)

6. *Ulceration from Blisters.* Louis pointed out that blisters in enteric fever were slow in healing, and apt to degenerate into unhealthy sores,^y and his experience has been confirmed by subsequent observers.

7. *Necrosis* is a more common sequel of enteric fever than of typhus (see p. 215). In two instances I have met with necrosis of the tibia, in two with extensive necrosis of the lower jaw during convalescence, and in one with necrosis of the temporal bone. (Case LXIII.) All of the patients were young children excepting one, a girl aged 16. In the Pathological Transactions,^z the case of a child is reported, in whom necrosis of the upper third of the femur followed an attack of enteric fever.

8. *Accidental Eruptions.* Herpes is occasionally observed on the lips. In three instances, of which two were fatal, I have seen large *bullæ* on various parts of the body. (See b. 216)

9. *Buboes.* Collections of pus in different parts of the body are not unfrequent after severe attacks of enteric fever; but the

^t GRIESINGER, 1864.

^u BARTHEZ and RILLIET, 1853, ii. 707. See also TROUSSEAU, 1861, p. 192.

^v GRIESINGER, 1864, p. 232.

^w WEST, 1848, ed. 1854, p. 561.

^x BARTHEZ and RILLIET, 1853, ii. 704.

^y LOUIS, 1841, ii. 124, 483.

^z *Path. Trans.* xx. 290.

* According to Sir J. Paget these patients
are always of scrofulous constitution

B. M. Journ. - 1875, I. 624.

See also Sir Jas. Paget, on some other sequelae
of Typhoid Fever. - Barth. Hosp. Rep. 1876.

Bez. De la Contemporanéité des Fièvres Éruptives
et de leur coexistence avec la Fièvre typhoïde chez
le même individu - Paris - 1877 -

hard inflammatory swellings in the region of the parotid and elsewhere, so common in typhus (see p. 216), are comparatively rare. I have met with 6 cases of parotid bubo, while Louis,^a Chomel,^b and Gairdner^c each report one case. Chomel regarded these swellings as critical and auspicious; but Trousseau^d scarcely ever knew a case recover in which they appeared. Five of my 6 cases died. (For pseudo-abscesses in muscles, see *Anatomical Lesions*.)

i. Marasmus.

It occasionally happens that after a severe attack of enteric fever, the patient remains very weak and anæmic, and continues to emaciate without any obvious cause. He has a repugnance to food; or he may eat well, but the food is not assimilated, and slight errors in diet will often cause flatulence, and rumbling noises in the abdomen, or sometimes diarrhœa. Yet the temperature is normal, or even too low, and no local disease can be recovered. I have known several cases prove fatal in this way months after the cessation of the fever, where no lesion could be discovered after death, except an unusually smooth appearance of the mucous membrane of the ileum, and a shrivelled condition of the mesenteric glands. Similar observations have been made by Rokitansky^e in fatal cases, but according to Griesinger^f the mesenteric glands are not invariably atrophied. Occasionally, as Dr. Allbutt^g has shown, the patient survives in this state of marasmus for years, all treatment failing to do good.

k. Other Specific diseases. (See p. 225.)

1. *Scarlatina.* In the London Fever Hospital, when it was the practice to treat all forms of fever in the same wards, it was not uncommon for a patient suffering from enteric fever to contract scarlet fever, and I have notes of 8 cases in which the eruptions of the two diseases co-existed. Similar cases have been recorded by Forget,^h Taupin,ⁱ and Peacock.^j The cases of scarlet merging into enteric fever already referred to (p. 453), have been cases where both poisons have acted on the system simultaneously, or in succession. The two following cases are

^a LOUIS, 1841, ii. 97, 371.

^b CHOMEL, 1834.

^c GAIRDNER, 1862 (2), 141.

^d TROUSSEAU, 1861, p. 170.

^e *Path. Anat. Syd. Soc. Transl.* ii. 81. See also, HUSS, 1855, p. 221.

^f GRIESINGER, 1864, p. 243.

^g ALLBUTT, 1871.

^h FORGET, 1841, p. 146.

ⁱ TAUPIN, 1839, p. 245.

^j PEACOCK, 1862, p. 138.

taken from my memoir on the Co-existence of Specific Morbid Poisons.^k

CASE LXXXI. *Co-existence of Scarlatina and Enteric Fever.*

A policeman, aged 23, was admitted into L. F. Hosp. Nov. 9th, 1857, having been ill two or three weeks. On admission, he had all the symptoms of enteric fever, including a red, glazed, and fissured tongue, tympanitis, profuse watery diarrhoea, and very numerous lenticular spots. Fresh spots continued to appear, and eight days after admission they were still very numerous, and the diarrhoea persisted. There was now, in addition, a punctated scarlet rash, identical with that of scarlet fever, a strawberry-red tongue with large papillæ, sore throat, and redness of the fauces. Two days later, lenticular spots still very numerous, and scarlet rash persisted. Two days after this, scarlet rash was fading, but lenticular spots continued out for a few days longer. A week after disappearance of scarlet rash there was copious desquamation. The patient made a good recovery.

CASE LXXXII. *Co-existence of Scarlatina and Enteric Fever.*

A boy, aged 14, was admitted into L. F. Hosp. Aug. 25th, 1858, from a house in which there had been other cases of enteric fever. He had all the ordinary symptoms, in a mild form. Lenticular spots appeared on 13th day of fever, and continued coming out in successive crops. On 22nd day there were still several spots, and also a punctated bright scarlet rash having all the characters of that of scarlet fever. The tongue, which before had been almost clean, became covered with a thick white fur, through which could be seen large red papillæ; throat sore; tonsils enlarged and red, and coated with a white membranous exudation. On same day, pulse was found to have risen from 72 to 132, and temperature under tongue from 98° to 104° Fahr. Both eruptions continued distinct for four days and then disappeared. On 25th day, tonsils were so large as almost to meet, and tongue was clean, red, and of a strawberry aspect. On 27th day, desquamation commenced. Convalescence was delayed by glandular swellings in neck, one of which terminated in abscess. After this boy's admission, a patient with scarlet fever lay in the adjoining bed, and there were many other cases in the same ward. 19

2. *Rubeola.* Barthez and Rilliet,¹ Taupin,^m Jenner,ⁿ and Kesteven^o have observed cases in which enteric fever and rubeola have co-existed.

3. *Variola and Vaccinia.* In the following remarkable case enteric fever was complicated with both Variola and Vaccinia.

^k MURCHISON, 1859, No. 4, p. 194.

^m TAUPIN, 1839, p. 245.

¹ BARTHEZ and RILLIET, 1853, ii. 706.

ⁿ *Lancet*, 1866, i. 619.

^o *Ib.*



CASE LXXXIII. *Co-existence of Enteric Fever, Vaccinia and Variola.*

Jane H—, aged 22, on Nov. 25th, 1863, was seized with pyrexia, great pain in the back, and vertigo. On the 27th she had rigors and diarrhœa set in, and for nearly a fortnight she had four or five stools a day. On the 28th she went to a Metropolitan Hospital, where she was told that she had small-pox, and sent to the Small-Pox Hospital. On Nov. 30th she was told by the physician of the S.-P. Hospital that she had not small-pox, but she remained in a small-pox ward until Dec. 2nd, when she was discharged, being previously re-vaccinated in three points in the left arm. On the evening of Dec. 5th she had another rigor, followed by lumbar pain more severe than before, and on the 8th by vomiting, on which day she was admitted into the Middlesex Hospital under Dr. A. P. Stewart. Here she presented all the symptoms of enteric fever; tongue red and dry; abdomen distended; tenderness over cæcum; diarrhœa, which continued more or less for ten days; and rose spots appearing in successive crops until Dec. 16th. Secondly, on Dec. 8th variolous papules appeared on face, so that the attack of small-pox probably commenced with the rigor on Dec. 5th, and the latent period could not have exceeded seven days. Only about a dozen papules ran the entire course, but the pustules were typical; there were very few on the body. Thirdly, the patient on admission had three characteristic vaccine-vesicles on the left arm, which on Dec. 9th (8th day) were surrounded by a distinct, though small, areola. She had been vaccinated in infancy, and had two marks on left arm. On Dec. 15th and 16th there was an increase of pyrexia, with restlessness and delirium, much albumen in urine, and a bubo over left parotid. This suppurated, and was opened on Dec. 20th, and after this patient recovered.

4. *Pertussis*. Gillespie^p mentions the case of a child who contracted whooping cough while suffering from enteric fever.

5. *Diphtheria*. Cases have been already referred to in which enteric fever was complicated with diphtheritic inflammation of the fauces and larynx (p. 557). In Case LXXXIV. there were also albuminuria and paralysis of the pharynx.

CASE LXXXIV. *Enteric Fever. Diphtheria. Albuminuria. Paralysis of Pharynx.*

Edward M—, aged 22, adm. into L. F. H., Sept. 24th, 1864, having been ill a fortnight with fever and diarrhœa. After admission, pulse 108; violent pugnacious delirium; tongue dry and red; much diarrhœa; rose spots. No fresh spots appeared after Oct. 4th, but the tongue continued dry and the bowels loose, and there was a thin purulent discharge from one ear. On Oct. 14th (35th day) it was found that the patient had difficulty in swallowing, apparently owing

^p GILLESPIE, 1870.

to paralysis of pharynx. When an attempt was made to swallow fluids, a great part was rejected by the nostrils. The dysphagia increased and the breathing became rapid and embarrassed, and the countenance dusky. Injections of beef-tea and brandy were administered by the rectum, but the patient died at 10 p.m. on Oct. 15th.

Autopsy.—Numerous small ulcers at lower end of ileum, most of them cicatrizing. Spleen 10 oz.; soft. Both kidneys large, smooth, and congested; cortices hypertrophied and opaque; weight of both together 17 oz.; urine in bladder contained a good deal of albumen. Epiglottis and upper third of larynx swollen and red, and the mucous membrane covered with a continuous thin false membrane, becoming broken up into shreds at its lower margin; no ulceration. Both lungs congested, with a few scattered patches of lobular pneumonia.

6. *Typhus* (See Chapter V).

SECTION IX. VARIETIES OF ENTERIC FEVER.

No acute disease presents itself under a greater variety of forms than enteric fever. As in many other diseases of the same class, the poison of enteric fever produces symptoms of a twofold nature, viz.: 1, general pyrexia, with derangement of all the bodily functions; 2, local disease in one particular part of the body, which in this case is the ileum. In some cases, the fever and general symptoms preponderate; in others, those of the local disease; in a third class, both are prominently developed; in a fourth, both occur in the mildest forms, or there may be no symptoms of the local lesion; while in a fifth, the primary disease is obscured by complications. These differences are partly accounted for by constitutional peculiarities in the patient, and partly by differences in the intensity, or perhaps quality, of the poison^a (p. 495)

Many varieties of enteric fever have been described by systematic writers. Among these may be mentioned: the *adynamic* or *low nervous* fever, of which the prominent characters are protracted pyrexia and great prostration; the *ataxic* form, sometimes called 'Brain Fever,' in which delirium and the typhoid state are well developed; the *abdominal* form, in which abdominal symptoms predominate; the *thoracic* form, in which thoracic complications are prominent; and the *hæmorrhagic* form, characterized by hæmorrhages from mucous surfaces, and into the skin (see pp. 515, 558). To these may be added the *ague-like* form, in which the disease commences like an attack of ague (see p. 545). This form is chiefly seen in persons who have

^a See MURCHISON, 1870.

Eccentricities of Spheroidal Figures.
Ed. Med. Journ. March. 1878.

See Jüngstentsten an Mild Typhoid
Fever. Volkmann's Sammlung Klin.
Vorträge. No. 61 Med. J. Hy. Feb. 14/74.

See Vallein, 1873.

been exposed to the malaria of ague, and in whom the poisons of the two diseases may be supposed to co-exist. But the varieties which call for especial notice are the following :

1. The *abortive* form is that in which the fever does not run its regular course, the intestinal lesions undergoing resolution, instead of advancing to ulceration. The disease commences like an ordinary attack of enteric fever, and at first there may be considerable pyrexia, the evening temperature about the fourth or fifth day rising to 104° or 105° (See p. 547, and Case LVII.) There is often considerable headache and restlessness; the tongue is coated and red at the edges; vomiting is not uncommon; sometimes there is diarrhœa, but more commonly constipation; epistaxis occurs in some cases; and very often, but not always, a few lenticular spots appear about the seventh day. The pulse, as a rule, is not much accelerated ($70-90$), and sometimes the temperature is the only evidence of the existence of fever. About the eighth or tenth day, the morning remissions become very decided and all the symptoms improve, and by the middle or end of the second week, the morning temperature may be normal, that of the evening continuing to rise several degrees for three or four days, or even a week, the type of the fever being now distinctly intermittent. But occasionally the fever terminates at the end of a week, and Griesinger and Bäumlér have observed cases in which its duration did not exceed five days. In my experience, the pyrexia even, in these short cases, terminates gradually by lysis (see p. 546), but according to Griesinger and Bäumlér it may terminate abruptly with copious perspiration. These abortive cases correspond to the *forme muqueuse* or mucous fever of French writers, and in this country they are commonly designated *Febricula*. The proofs that they are really cases of enteric fever are, that in some of the cases there are characteristic rose spots, and that they are often found to occur in the same house as typical cases of this disease.

2. The *insidious* or *latent* form is another important variety of enteric fever. It was well described by Dr. Hewett^r of London in 1826; and it has been prominently noticed by Louis, Chomel, and many other writers. In this form all the symptoms are mild; there may be little or no acceleration of the pulse; prostration and increase of temperature may be the only signs of pyrexia, and yet the fever has its usual duration of

^r HEWETT, 1826.

three or four weeks, and the intestinal lesion takes its ordinary course. In some cases, the chief symptoms are irregular chills, alternating with heat and flushing, slight headache, loss of appetite, lassitude, and disturbed sleep; diarrhœa may be absent, or there may be constipation. In other cases, the patient complains chiefly of bronchial catarrh, and is thought to have merely 'taken a cold.' In a third class, the chief symptoms are nausea, vomiting, and a red tongue, and the illness is regarded as a 'bilious attack,' or 'gastric fever.' In any of these ways the patient may pass through the entire attack and make a good recovery, and then his illness is often spoken of as '*simple continued fever*;' but very often he becomes suddenly and alarmingly ill.^s Acute maniacal delirium sets in; a profuse hæmorrhage from the bowels takes place, which may terminate fatally; or more commonly symptoms of perforation show themselves, which after a few hours terminate in death. (Cases LXVII. and LXVIII.) Before the alarming symptoms occur no anxiety is felt about the patient, and his prostration may be so slight that he is able to follow his ordinary avocations, or to attend as an out-patient at some hospital, until within a few hours of the fatal event (see p. 568). Hence cases of this sort have been designated by German writers, *Typhus ambulatorius*. The very fact of the patient walking about is calculated to rupture the denuded peritoneum forming the base of the intestinal ulcers (see p. 567).

3. *Gastric or Bilious Fever*. It is still a common belief that 'gastric fever' is an idiopathic fever distinct from enteric.^t Medical literature, however, contains no facts in support of such a view. The gastric and stomachic fevers described in the last century by Ballonius, Heister, and Burserius^u were unquestionably enteric fever. Cheyne^v and Craigie^w were the first to employ the term 'gastric fever' in this country, and their descriptions of the symptoms and anatomical lesions show plainly that the disease which they had in view was also enteric fever; and the same remark applies to the gastric fever described by the late Dr. Anderson of Glasgow.^x What many modern practitioners mean by 'gastric fever' is a mild con-

^s A similar observation is made by Trousseau, who also remarks that the fever may continue for from twelve to thirty days, without the symptoms being sufficiently urgent to oblige the patient to take to bed, the bowels all the time being either regular or constipated (*Clin. Lect. Eng. Transl.* ii. 318).

^t The registrar-general for Scotland, in his division of Continued Fevers, makes gastric distinct from enteric (see STARK, 1865).

^u BURSERIUS, 1785.

^v CHEYNE, 1833.

^w CRAIGIE, 1837 (1).

^x ANDERSON, 1861, p. 122.

tinued fever accompanied by symptoms of gastric irritability; but so far as my experience extends, if we except a few instances in which febrile symptoms are symptomatic of gastric or biliary derangement from non-specific causes, what is commonly called 'gastric' is really enteric fever in an abortive or latent form, with retching or other gastric symptoms. Many facts attest the correctness of this view. Cases answering to the description of 'gastric fever' constantly occur in the same house with typical enteric fever; rose spots are present in many cases; a case may run the course of gastric fever, and be followed by a relapse of well-marked enteric fever; and, lastly, cases are not uncommon which for the first two or three weeks would be regarded as gastric, but which ultimately pass into the typhoid state and prove fatal, the lesions of enteric fever being found in the dead body. Such cases are often spoken of as 'gastric fever passing into typhoid,' but this very expression is opposed to the individuality of 'gastric fever,' for one acute specific disease is not convertible into another.

4. The *acute* form of enteric fever is that in which the disease commences abruptly and with great violence. Within a day or two, and sometimes from the commencement, there is acute delirium, with or without diarrhoea. Pulmonary congestion sets in early, and often extends with great rapidity; and death may occur in the first, or early in the second week, before ulceration has commenced in the bowels. (See Cases XLVII., LVIII., and p. 548.) ly

5. *Infantile Remittent Fever*. Children have long been known to be very liable to fever attended by gastric and intestinal disorder, to which the terms Worm Fever, Infantile Hectic, Infantile Gastric, and Infantile Remittent Fever have been applied. Abercrombie,^z Wendt,^a Billard,^b Meissner,^c Evanson and Maunsell^d accurately described both its symptoms and anatomical lesions, but they regarded the fever as symptomatic of the local disease, and as peculiar to children. So little was it thought to be the same as the enteric fever of adults, that Chomel, in 1834, wrote concerning the latter affection as follows: 'Nous ne craignons pas de nous tromper en disant, que ce nombre va continuellement en diminuant jusqu'à l'âge de dix ans, au dessous duquel il paraît que les enfans ne sont que très rarement atteints de cette affection.' In 1836, M. Hutin^e pub-

^z See also TROUSSEAU, *Clin. Med. Syd. Soc. Transl.* ii. 358.

^a ABERCROMBIE, 1820.

^b WENDT, 1822.

^c BILLARD, 1828.

^d MEISSNER, 1838.

^e EVANSON and MAUNSELL, 1836.

^f HUTIN, 1836.

lished the account of an epidemic of enteric fever in children; but it is to Messrs. Rilliet,^f Taupin,^g Löschner,^h and Stoeber,ⁱ and to the writings of our countryman, Dr. West,^j that we are indebted for establishing the identity of infantile remittent fever with the enteric fever of adults. It is now known that children are particularly liable to enteric fever, for they are often attacked when other members of the family escape. The symptoms and complications are, to some extent, modified by the age of the patient, as has already been shown, and the remittent type of the pyrexia is even more marked than in adults. It does not follow, however, that all remittent fevers in children are really examples of enteric fever. Children are liable to feverish attacks which may assume a remittent type, and which are independent of any specific poison, and merely symptomatic of some gastro-intestinal disturbance; but under proper treatment these attacks may be expected to subside within a week. In aguish countries, also, children as well as adults are liable to malarious remittent fever. But it is contended by some observers, that many cases of remittent fever in children in London and other parts of the country where ague is unknown, are malarious and curable by quinine.^k The question can only be settled by *post-mortem* examinations, which are still wanting; but it may be mentioned that true enteric fever with rose spots often assumes a very remittent character, especially in children, and is then sometimes benefited by quinine. According to my experience, idiopathic remittent fever in children is almost invariably enteric.

6. *Enteric Fever in Aged persons.* When enteric fever occurs in persons over fifty, the onset is usually insidious; debility and tremors are often prominent symptoms; the type of the fever is essentially adynamic. Rose spots, acute delirium, and urgent diarrhoea are rarely observed. The pyrexia is usually protracted, but the temperature, even in fatal cases, is rarely so high as in younger persons, and more often falls below normal in convalescence. Collapse is not uncommon.

SECTION X. DIAGNOSIS OF ENTERIC FEVER.

During the first week of the disease it may be impossible to form a positive diagnosis; but even then enteric fever may be

^f RILLIET, 1840.

^h LÖSCHNER, 1846.

ⁱ STOEBER, 1841.

^g TAUPIN, 1839.

^j WEST, 1848.

^k See C. H. JONES, *Brit. Med. Journ.* July 1858, and January 25, 1862; WILKS, *Ib.* June 25, 1870.

suspected if there be pyrexia, with nocturnal exacerbations each night becoming more severe, and especially if this be attended by diarrhœa, enlarged spleen, or epistaxis.

When, after febrile symptoms of about a week's duration, lenticular rose spots appear in successive crops as described at page 509, the diagnosis of enteric fever is certain, whatever be the other symptoms. Two or three characteristic spots will be sufficient.

Even if there be no spots, or if those present be not characteristic, the diagnosis of enteric fever may be positive in a case where pyrexia of a remittent type has lasted upwards of a week and is associated with diarrhœa, ochrey stools, tympanitis and abdominal pain, enlarged spleen, or epistaxis.

If both the eruption and abdominal symptoms be absent, the diagnosis of enteric fever can only be arrived at by a process of exclusion, after carefully comparing the symptoms with those of the other diseases with which enteric fever is most apt to be confounded; but practically this rule will be found to hold good. A fever which in this country (aguish districts excepted) persists beyond seven days, and is unattended by cutaneous eruption, or by signs of local disease in the head, chest, or elsewhere, is in all probability enteric fever, even though there be no symptoms of intestinal lesion. Almost the only source of fallacy is latent tuberculosis (p. ✓).

The diseases most apt to be confounded with enteric fever are the following:—

1. *Typhus*. The diagnosis of typhus from enteric fever is rarely a matter of much difficulty. It must be remembered, however, that the typhoid state may be as developed in enteric fever as in typhus, and also that the presence of diarrhœa does not distinguish the former malady from the latter. Typhus may be complicated with diarrhœa (p. 208), and the bowels may be constipated in enteric fever (p. 524). The eruptions are the grand distinguishing marks between the two diseases; when they are present there can be no difficulty in forming a diagnosis (p. 512); and although, unfortunately, the eruption of enteric fever is often absent, that of typhus is rarely so, so that the mere fact of there being no eruption by the fifth or sixth day would in itself be in favour of typhus. Typhus also will be distinguished by its more sudden onset (pp. 179 and 544), by the less remittent character of the pyrexia (pp. 157, 516), by its shorter duration (pp. 185, 546), and by its terminating by crisis rather than by lysis (pp. 183 and

546). When diarrhoea co-exists with tympanitis and abdominal pain and the stools are ochrey, it may be concluded that the case is enteric fever, and this opinion will be strengthened by the occurrence of epistaxis or of intestinal hæmorrhage. The circumscribed pink flush often seen in the sunken cheek of enteric fever contrasts strongly with the heavy expression, the dusky countenance, and the injected conjunctivæ of typhus. The diagnosis is also assisted by the appearances of the tongue (pp. 146 and 520) and pupil (pp. 177 and 541), and by the circumstances under which the disease is contracted (pp. 118 and 496).

2. *Relapsing Fever*. Cases of enteric fever followed by a relapse are occasionally designated 'Relapsing Fever.' The clinical histories, however, of enteric and true relapsing fever are so very different, that it is impossible for any person practically acquainted with both to mistake one for the other (pp. 308 and 417).

3. *Remittent Fever*. The diagnosis between enteric and remittent fever is often extremely difficult in countries where both prevail together. The pyrexia of enteric fever is essentially remittent (pp. 516 and 545), and cases have occurred in my own practice and been noted by Trousseau¹ and other observers,^m especially in malarious countries, in which it has put on at first an intermittent type (p. 545). Moreover, vomiting and diarrhoea may occur in both diseases; while enlargement of the spleen, cerebral symptoms, and the typhoid state are common to both. The eruption is perhaps the only distinctive mark of enteric fever to be relied on, and in every case of remittent fever complicated with abdominal symptoms it ought to be carefully looked for. The close resemblance of enteric to remittent fever accounts for the fact, that it is only within the last few years that the former malady has been recognized as occurring in India (see p. 436).

4. *Scarlatina*. Cases of enteric fever in which the lenticular spots are preceded by a uniform scarlet rash (p. 515) are sometimes mistaken for scarlatina, especially if there be at the same time sore throat. But the mistake is easily avoided. As a rule, the throat is not sore, and merely dry; the tongue and throat do not present the appearances of scarlatina; while the rash does not make its appearance until the fourth or fifth day of the disease. The gradual rise of temperature in enteric

¹ TROUSSEAU, 1861, p. 171; and *Syd. Soc. Transl.* ii. 364.

^m BARTLETT, 1856, p. 134.

fever is also very different from the abrupt invasion of scarlatina.

5. *Variola*. More than once I have known a copious eruption of lenticular spots mistaken for variola. But the spots are never hard, gritty, nor acuminated; they do not appear before the seventh day of illness, and they are absent from the face; and they are not preceded by the severe lumbar pain marking the invasion of small-pox.

6. *Pyæmia* may simulate enteric fever very closely,^a although the absence of lenticular spots, the icteric tint, the rigors and profuse sweatings, and the circumstances under which it appears, usually suffice to distinguish the former malady. Many cases of *Puerperal Fever* put on the ordinary symptoms of enteric fever, such as pyrexia with the typhoid state, a distended abdomen and diarrhœa; and seeing that lenticular spots may be absent in enteric fever, and rigors in puerperal fever, it is obvious that it may sometimes be impossible to form a positive diagnosis between the two maladies. Moreover, the difficulty may be enhanced by the circumstance of enteric fever in the puerperal state being followed by pyæmia. According to my experience, even in those cases of pyæmia which most closely simulate enteric fever, the variations of temperature are much greater.

7. *Influenza*, especially when epidemic, may, I have reason to think, sometimes closely simulate enteric fever. In both maladies there is fever with great prostration, occasional perspirations, and not unfrequently sleeplessness, delirium, and the typhoid state. Bronchial catarrh, pleuro-pneumonia, deafness and discharge from the ears, so common in influenza, are far from being unknown in enteric fever; while epistaxis, a red, and even glazed, dry tongue, and diarrhœa may be observed in influenza.^o Some years ago I was consulted about an outbreak in a country house, in which there was difficulty in pronouncing an opinion between enteric fever and influenza. An entire family, consisting of father, mother, and six children, as well as a servant, were taken severely ill within a few days. In 8 of the 9 cases there was pyrexia, and in several perspirations, great prostration, and a tendency to delirium. In 8 of the cases the attack commenced with acute bronchitis, in 3

^a See a case observed by author, *Med. Times and Gaz.* March 19, 1864. I have also known several instances of pyæmia due to caries of the temporal bone run a course very like that of enteric fever.

^o Consult *Annals of Influenza*, published by Syd. Society, Lond. 1852.

there was acute pleuro-pneumonia, and in 5 earache with deafness and more or less purulent discharge from the ears, while in one case these last were the only symptoms. In none was there any eruption, but in 3 of the cases there was copious epistaxis, in 2 there was a dry red tongue, with distended abdomen, diarrhoea, and ochrey stools, and in one slight hæmorrhage from the bowels. All recovered, several within a week, and in none did the disease run the protracted course of enteric fever.

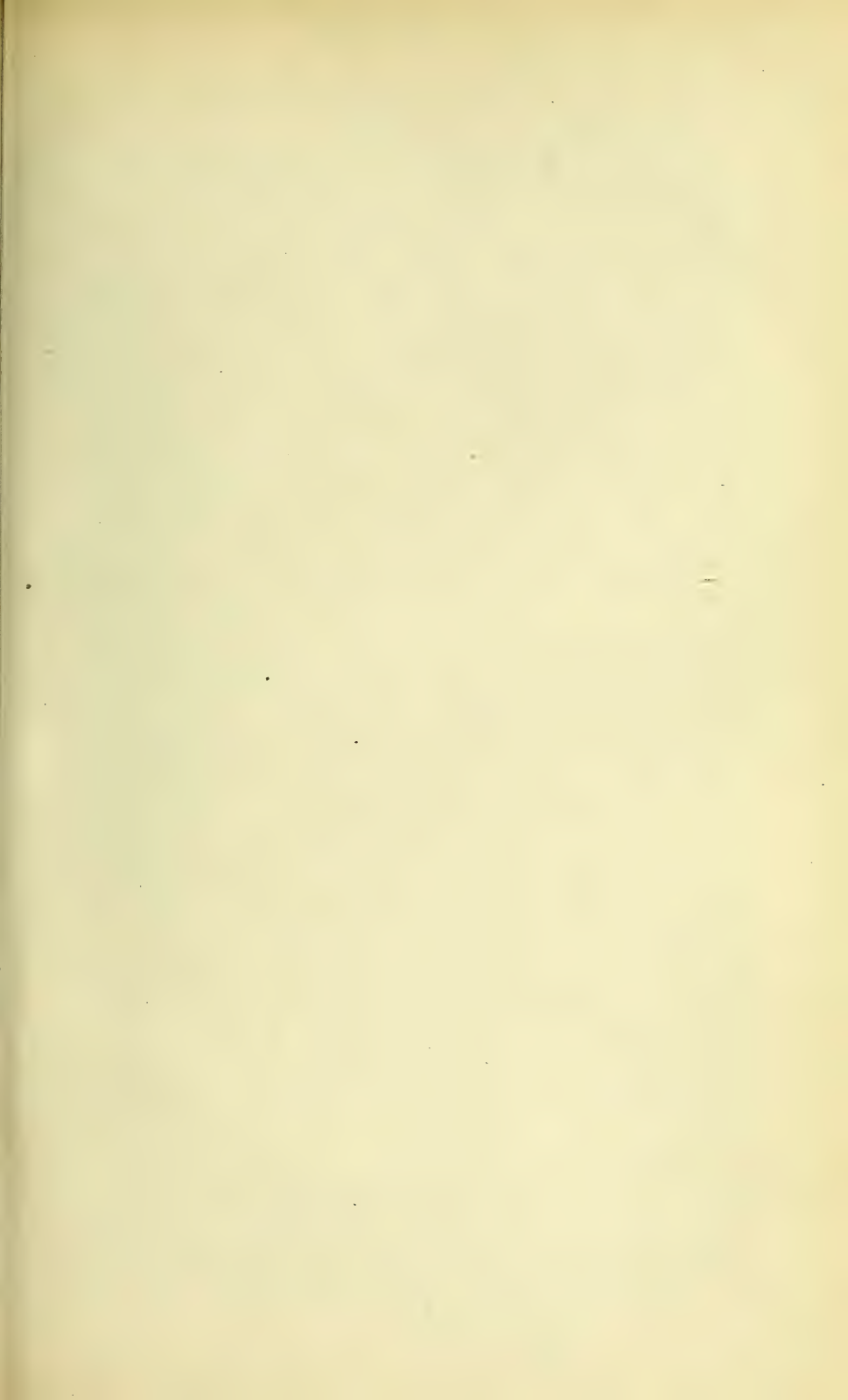
8. *Tuberculosis*. The various manifestations of tuberculosis constitute the maladies most difficult to distinguish from enteric fever.

a. *Tubercular meningitis*. Many writers have laid down rules for distinguishing this disease from enteric fever,^p but at the bedside all these rules are sometimes unavailing. Pyrexia with remissions, headache, delirium, vomiting, cerebral maculæ,^q and even partial palsy, inequality of pupils, rolling the head from side to side, and the hydrocephalic cry^r may occur in both diseases; while rose spots are oftenest absent in enteric fever at the age when the difficulty in diagnosis is most likely to arise. In cases of difficulty, the following are the points of distinction most to be relied on:—In meningitis the vomiting at the outset is usually more urgent; the tongue is rarely dry and brown, as it is in most cases of fever with severe cerebral symptoms; the temperature does not follow the course observed in enteric fever; it is liable to sudden falls, and for several days it may be normal, while the other symptoms are getting worse, and towards the end the temperature may sink, while the pulse is rising; the bowels are usually constipated, or if there be diarrhoea the stools are not ochrey as in fever; the abdomen is retracted and painless, instead of being distended and tympanitic; enlargement of the spleen, intestinal hæmorrhage, and epistaxis, often observed in fever, are not met with in meningitis; the headache is more acute in meningitis, persists after the occurrence of delirium, and is often associated with intolerance of light and sound, which is not the case in

^p WEST, 1848, 5th ed. 1865, p. 91; TROUSSEAU, *Clin. Lect. Eng. Ed.* vol. i. p. 468.

^q These are produced by gently scratching the skin with a pencil or the fingernail. The part touched rapidly becomes bright red, and this colour persists for ten or fifteen minutes. Trousseau lays great stress on these maculæ as diagnostic of meningitis; but in those cases of enteric fever in which any difficulty in diagnosis is likely to arise, they may be produced as readily as in meningitis.

^r See a case observed by Dr. H. Roger of Paris. A child, aged 23 months had pyrexia with acute headache, hydrocephalic screams, meningeal maculæ, strabismus, persistent vomiting, and constipation. The lesions of enteric fever were found in the bowel, but the brain and membranes were healthy (*Lancet*, November 7, 1868, p. 601).



fever; in meningitis the patient rolls his head from side to side, while children utter from time to time the hydrocephalic cry; partial paralysis and irregularity of respiration point to meningitis rather than to fever; and lastly, in meningitis the patient is more irritable, and offers greater resistance to any examination. Another distinctive mark has been recently discovered by Cöhnheim, who, with the ophthalmoscope, has found minute tubercles in the choroid in a large number of cases of acute tuberculosis.⁶ The occurrence of other cases of fever in the same house would favour the supposition of fever, while the circumstance of other children in the same family having died of tubercle would support the diagnosis of tubercle.

b. Tubercular Peritonitis. I have met with several cases of tubercular peritonitis, which at first closely resembled enteric fever, the symptoms being fever, occasional perspirations, vomiting, abdominal pain, diarrhœa, great prostration and emaciation, hectic flush on the cheeks, bronchitic râles, and ultimately delirium. In many cases, however, the abdomen is retracted,⁴ and the temperature usually after a time becomes sub-normal.

c. Acute Tuberculosis of the Lungs may be mistaken for enteric fever. Pyrexia of a remittent type, perspirations, great emaciation, and muscular prostration, circumscribed flushes on the cheeks, a dry tongue, delirium, stupor, dyspnœa, and bronchitic râles are phenomena which may be common to both affections. Even pulmonary consolidation may occur in enteric fever, and cases occur in which from the physical signs of the lungs it is impossible to distinguish between the two diseases; while diarrhœa may be absent in fever, or may be present, even with ochrey stools, in acute phthisis when there are tubercular ulcers of the bowel, although the abdomen is usually retracted, instead of being distended and tympanitic as in fever. The presence of characteristic rose spots⁵ and enlargement of the spleen would be evidence of fever, but their absence does not prove the contrary. In all doubtful cases, the family history and the circumstances under which the disease has appeared ought to be carefully investigated, and it will be well to determine by

⁶ Letter from Dr. Zuelzer of Berlin. See also WELLS, *Path. Trans.* xix. 359.

⁴ On the other hand, Dr. Hudson remarks that he has usually found the abdomen distended in tubercular peritonitis (HUDSON, 1867, p. 162).

⁵ Spots somewhat resembling those of enteric fever have been observed in acute phthisis by Waller of Prague, Barthez and Rilliet (JENNER, 1853, p. 465), and E. L. Fox (*Brit. Med. Journ.* December 13th, 1862). I have looked for them in a large number of cases, but only in one instance found anything resembling them (Case LXXXVI).

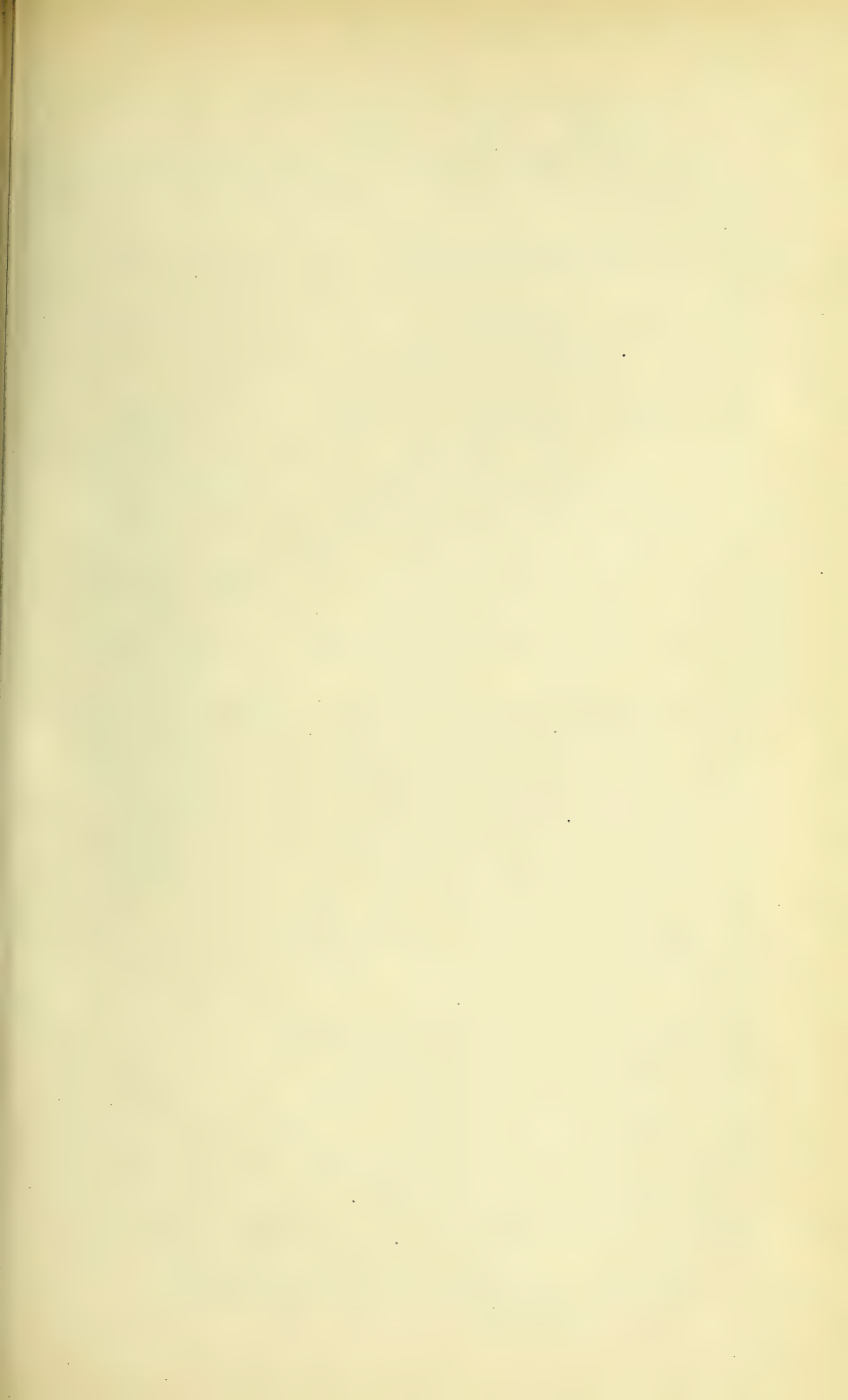
the ophthalmoscope the presence or absence of tubercles in the choroid (p. 595); while the fact that acute phthisis may be a sequel of enteric fever must not be lost sight of (p. 556).

d. Latent Tubercle. It now and then happens that tubercle is deposited in different parts of the body, although careful examination of the lungs and other organs may for many weeks fail to disclose its site. Under these circumstances the patient emaciates, loses strength, and has pyrexia with nocturnal exacerbations, and from the absence of any signs of local disease he is thought to be suffering from 'low fever.' Several cases of this sort have come under my notice, and one I saw in consultation with Sir W. Jenner, in which enteric fever was first excluded from the diagnosis by the duration of the febrile symptoms exceeding a month; this patient ultimately died of pulmonary phthisis.

CASE LXXXV. *Enteric Fever, simulating acute Tuberculosis.*

Mary Ann B—, aged 25, adm. into Middlesex Hosp. Oct. 11th, and died Oct. 17th, 1870. She was an only child, her mother having died early in life of consumption. The patient's own previous history also pointed to chronic pulmonary phthisis. She had never been strong, and for many years had suffered from cough, which for twelve months had been much worse, and accompanied by emaciation and night-sweats. Her friends stated that about twelve days before admission she had become feverish, and at the same time the cough had become worse, and attended by purulent expectoration, profuse perspirations, rapid emaciation, and great prostration. When in hospital she had exactly the appearance of a person in an advanced stage of phthisis. She was extremely emaciated, and had a circumscribed pink flush on the cheeks, which came and went. Pulse varied from 120 to 140, and temperature from 101° to 103°·5. During sleep she was bathed in profuse perspiration, with which hands were quite sodden. Respirations 40; great dyspnoea; expectoration of a large quantity of creamy pus; voice husky; coarse moist râles heard everywhere over both lungs. Tongue dry and red; abdomen flat; no diarrhoea. Skin of trunk covered with miliary vesicles, but no other eruption. Constant delirium and sleeplessness. The treatment consisted in stimulants, quinine, mineral acids, and hydrate of chloral to induce sleep. No improvement took place. On Oct. 15th upwards of a pint of liquid blood was passed from the bowel, and after this patient rapidly sank and died on Oct. 17th. With the exception of the intestinal hæmorrhage two days before death, all the facts in this case pointed to phthisis rather than enteric fever.

Autopsy.—No tubercle anywhere. Numerous typhoid ulcers at lower end of ileum, their margins formed by loose fringes of mucous membrane free from any morbid deposit. Lungs intensely congested



Synchytrium *Leues*. See *Bäumler*.
Leues III. 127.

and cedematous; commencing lobular pneumonia in lower lobes of both, and recent lymph on surface of left. At entrance to larynx several small ulcers, the largest forming a deep excavation below the epiglottis, and being the apparent source of the pus expectorated during life.

CASE LXXXVI. *Acute Tuberculosis with Eruption and other Symptoms, simulating those of Enteric Fever.*

Walter P——, aged 17, died in L. F. Hosp. on July 26th, 1869, on 43rd day of a feverish attack, for which he had been admitted into the hospital on June 16th. His symptoms were—pulse varying from 84 to 96; hot skin; a dry tongue, red at the tip and edges, and in the first instance diarrhoea; enlargement of the spleen; restlessness and delirium; and bronchial râles over chest. There was no acute headache, screaming, rolling of the head, inequality of the pupils, or paralysis; but from the 4th day until death there were successive crops of circular reddish spots disappearing on pressure, and very like those of enteric fever. They differed, however, from those of enteric fever in their early appearance, and in the long period over which they kept coming out. Still, during life, the case was regarded as one of enteric fever. In the night of July 25th the patient was taken suddenly worse with symptoms of congestion of the lungs, and died within two or three hours.

Autopsy.—No sign of ulceration in ileum. Lungs, liver, spleen, kidneys, and peritoneum studded with miliary tubercles. Spleen weighed 19½ oz. Mesenteric glands and some of solitary glands in ileum, also enlarged from tubercular deposit. Head not examined.

9. *Mania.* Where acute delirium sets in suddenly at the commencement of enteric fever, or in a case where the previous symptoms have been mild, the illness is sometimes mistaken for insanity. I have known this mistake committed in several instances (p. 535), but the presence of pyrexia and of some of the other symptoms of enteric fever removes all real difficulty from the diagnosis.

10. *Pneumonia* with typhoid symptoms is sometimes mistaken for enteric fever as well as for typhus. In children, pneumonia is often accompanied by great sympathetic disturbance of the stomach and bowels, which obscures the primary disease; while in adults, pneumonia is occasionally complicated with dysentery.* On the other hand, enteric fever may be complicated with pneumonia. When the pneumonia appears late in the disease, the diagnosis is sufficiently easy; but when, as rarely happens, the pneumonia occurs within the first week or

* WEST, 1848, 5th ed. 1865, p. 338; BARTHEZ and RILLIET, 1853, ii. 699.

† BRISTOWE, *Trans. Path. Soc.* viii. 66.

ten days, there may be some difficulty in deciding whether it be primary or secondary.

11. *Gastro-enteritis*. Under this term may be included all those derangements of the stomach and bowels accompanied by fever, but where the pyrexia is secondary instead of primary. The enteric symptoms of fever may be mistaken for those of an irritant poison (pp. 468 and 480), or for enteritis, colitis, typhlitis, or gastric irritation, or each of these conditions may be mistaken for enteric fever. In several instances I have known patients sent into the Fever Hospital with typhlitis, who were supposed to have enteric fever. In adults, enteric fever is usually distinguished without difficulty from these local affections by the peculiar range of temperature, by the eruption, the greater degree of muscular prostration, headache, cerebral symptoms, epistaxis, enlargement of the spleen, and by the characters of the stools (p. 524).^{*} In children, however, under five years of age, in whom general disturbance and delirium are more apt to result from local causes, the diagnosis may be more difficult;[†] but even in them enlargement of the spleen would favour fever, and the presence of rose spots would settle the question.

12. A '*Bilious Attack*.' One of the most common errors in diagnosis is to mistake the early symptoms of enteric fever for those of a common bilious attack, and in consequence much mischief is often done by the injudicious use of purgatives. This error would be avoided by recourse to the thermometer in any case of doubt.

13. *Trichiniasis* excites a group of symptoms very similar to those of enteric fever, viz., pyrexia with vomiting and diarrhoea followed by typhoid symptoms. Hence it is believed that some of the reported outbreaks of enteric fever have been really outbreaks of trichiniasis.[‡] The latter disease, however, is distinguished by severe muscular pains, cedema of the eyelids and sometimes of the whole body, and the absence of rose spots, enlargement of the spleen, and epistaxis.

^{*} The reader is referred to a Table, in which Louis contrasts the symptoms of 17 cases of enteric fever with 23 of enteritis (LOUIS, 1841, ii. 409).

[†] See BARTHEZ and RILLIET, 1853, ii. 699.

[‡] See a memoir by Prof. Liebermeister, *Deutsch. Archiv*, 1867, iii. 223.

SECTION XI.—PROGNOSIS AND MORTALITY.

a. Rate of Mortality.

Table LII. gives the rate of mortality among the cases of enteric fever admitted into the London Fever Hospital during

TABLE LII.^a

Years	Admissions	Deaths	Mortality per cent.	Years	Admissions	Deaths	Mortality per cent.
1848	152	41	26·97	1860	95	27	28·42
1849	138	26	18·84	1861	161	32	19·87
1850	137	24	17·51	1862	220	30	13·63
1851	234	30	12·82	1863	174	25	14·36
1852	140	25	17·85	1864	253	52	20·55
1853	212	59	27·83	1865	523	103	19·69
1854	228	42	18·42	1866	582	101	17·35
1855	217	28	12·90	1867	380	53	13·94
1856	149	23	15·43	1868	459	72	15·68
1857	214	30	14·02	1869	369	58	15·71
1858	180	26	14·44	1870	595	93	15·63
1859	176	34	19·31				
Total				5,988	1,034	17·26	
Deducting 1 patient dead before reaching hospital, and 47 who died within 24 hours				5,940	986	16·59	
Deducting 55 additional, who died within 48 hours				5,885	931	15·82	

twenty-three years. It appears that out of 5,988 cases, 1,034 died, making a mortality of 17·26 per cent., or of 1 in 5·79; but deducting those patients who were moribund on admission, the mortality falls to 15·82 per cent., or to 1 in 6·32. The mortality, in fact, was about the same as that of typhus (see p. 234). In comparing these results with those observed elsewhere, it will be necessary to keep in view three facts: 1. Every patient admitted with enteric fever and dying in the hospital has been registered as a death from enteric fever, although death may have been due to some sequel, months after recovery from the primary attack; 2, many abortive cases, all of which recovered, have been registered as 'febricula' and not as enteric fever; 3, a large proportion of the slighter cases were never brought to the hospital at all.

^a See note, p. 234.

The death-rate of enteric fever in different hospitals is influenced by the same circumstances as that of typhus (p. 235), and varies considerably, as will appear from the following Table.

TABLE LIII.

Hospitals	Cases	Deaths	Mortality per cent.
Paris, Chomel ^b	147	47	32
Strasbourg, Forget ^c	190	44	23.15
Paris, 1854 ^d	4,611	1,002	21.73
King's College Hospital, 18 years, Dr. Todd ^e	131	27	20.61
Guy's Hospital, 1861-70 ^f	280	54	19.28
St. Thomas's Hospital, Peacock ^g	74	14	18.9
Glasgow Royal Infirmary, 1847-53 and 1857-69 ^h	1,290	237	18.37
Provinces of France, 1841-61 ⁱ	9,974	1,667	16.7
Nine Hospitals in Germany ^j	7,963	1,324	16.62
St. Bartholomew's Hospital, 1860-7 and 1869 ^k	464	73	15.73
Aberdeen Royal Infirmary, 1865-69 ^l	138	20	14.49
Edinburgh Royal Infirmary, 1860-70 ^m	880	110	12.5
City of Glasgow Fever Hospital, 1865-70 ⁿ	304	35	11.51
Cork Fever Hospital ^o	248	17	11.48
Dundee Royal Infirmary, 1857-70 ^p	457	52	11.37
Total	27,051	4,723	17.45

b. Circumstances influencing the rate of mortality.

1. *Age.* The influence of age on the mortality of enteric fever is shown in Tables LIV. and LV. Table LIV. shows the mean age of the cases admitted into the London Fever Hospital during ten years (1848-57).

TABLE LIV.

Cases	Number	Mean Age
Total admissions in which age known	1,772	21.25
Cases which recovered	1,444	20.7
Cases which died	328	23.54

Table LV. gives the death-rate in each quinquennial period of life of all the cases admitted during twenty-three years.

^b CHOMEL, 1834.^c FORGET, 1841, p. 440.^d DAVENNE, 1854.^e *Brit. and For. Med. Chir. Rev.* October 1860, p. 332.^f *Reports.*^g PEACOCK, 1856 (No. 1).^h MCGHIE, 1855, p. 161, and *Reports.*ⁱ DE CLAUBRY, 1849, p. 31.^j ZUELZER, 1869, p. 24.^k *Reports.*^l *Reports.*^m *Letter from Superintendent.*ⁿ *Reports.*^o *Reports.*^p *Reports.*

TABLE LV.

Age	Males			Females			Total		
	Admis- sions	Deaths	Mortality per cent.	Admis- sions	Deaths	Mortality per cent.	Admis- sions	Deaths	Mortality per cent.
Under 5 years .	24	3	12'50	34	4	11'75	58	7	12'06
From 5 to 9 years .	331	37	11'17	227	26	11'45	558	63	11'28
" 10 to 14 " .	629	70	11'12	545	81	14'86	1,174	151	12'86
" 15 to 19 " .	744	95	12'76	844	151	17'89	1,588	246	15'48
" 20 to 24 " .	545	127	23'30	619	111	17'93	1,164	238	20'36
" 25 to 29 " .	297	51	17'17	303	72	23'76	600	123	20'50
" 30 to 34 " .	156	51	32'69	141	25	17'73	297	76	25'59
" 35 to 39 " .	96	25	26'04	105	28	26'66	201	53	26'36
" 40 to 44 " .	64	18	28'12	60	15	25'00	124	33	26'61
" 45 to 49 " .	27	9	33'33	37	5	13'51	64	14	21'87
" 50 to 54 " .	13	3	23'07	23	5	21'73	36	8	22'22
" 55 to 59 " .	12	6	50'00	8	3	37'50	20	9	45'00
" 60 to 64 " .	12	6	50'00	8	3	37'50	20	9	45'00
" 65 to 69 " .	3	1	33'33	2	1	50'00	5	2	40'00
" 70 to 74 " .	..	..	..	..	..	..	..	..	..
" 75 to 79 " .	2	1	50'00	..	..	..	2	1	50'00
Age doubtful .	46	1	2'17	31	..	0'	77	1	1'29
Total, including doubtful cases }	3,001	504	16'79	2,987	530	17'74	5,988	1,034	17'26

From these tables it appears that the death-rate of enteric fever is not influenced by age to the same extent as that of typhus. (See pages 236, 398; and compare Diagrams II. and VIII. with XII. and XIX.) There is a greater uniformity in the rate of mortality at different periods of life in enteric fever. The death-rate increases with age to a much less extent than in typhus, and the small rate of mortality observed in early life in typhus does not occur in enteric fever. This contrast between the two diseases is well shown in the following comparison of the cases admitted into the London Fever Hospital.

TABLE LVI.

	Typhus			Enteric Fever		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Under 10 years .	1,221	40	3'27	616	70	11'36
From 10 to 14 " .	1,812	30	1'65	1,174	151	12'86
" 15 to 19 " .	2,348	93	3'96	1,588	246	15'48
" 20 to 29 " .	3,257	402	12'34	1,764	361	20'46
" 30 to 39 " .	2,346	531	22'63	498	129	25'90
" 40 to 49 " .	2,010	723	35'97	188	47	25'
Above 50 " .	1,499	855	57'03	83	29	34'94

From this, it appears that up to 40 years of age enteric fever is a much more fatal disease than typhus; and that

the circumstance of the gross mortality of the latter being somewhat greater, is due to the much larger proportion of typhus patients exceeding 40 years of age, and to the death-rate after that period of life being much in excess of that in enteric fever.

Louis states that none perished out of 6 of his patients under 17 years, and that during ten years' hospital experience he had only known 1 case prove fatal under 20;^a but, probably, few cases were admitted into the Hôtel Dieu at an early age. Barthez and Rilliet ascertained that 29 out of 111 children attacked with enteric fever died.^r Of 2,282 cases under 15 years in the provinces of France, 256, or 11·22 per cent., died; whereas of 7,692 cases above 15, 1,411, or 18·34 per cent., died.^s In Paris in 1854, the deaths among 260 cases under 15 were 68 (26·15 per cent.); among 4,275 cases between 15 and 50, 911 (21·31 per cent.); and among 76 cases above 50, 23 (30·26 per cent.).^t

2. *Sex.* From Table LV. it appears that the mortality from enteric fever in the London Fever Hospital has been about 1 per cent. higher among females than among males, this result being the reverse of that obtained in the case of typhus (see p. 238). The excess of mortality among females is not accounted for by the influence of child-bearing upon the course of the fever, for it was much more decided between the ages of 5 and 15 than in the period of child-bearing (15-45), and in three lustra of this period there was an excess of mortality among males. After the age of 40, the mortality among males was considerably more than that of females.

TABLE LVII.

AGES	MALES			FEMALES		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
From 5 to 14 years . . .	960	107	11·14	772	107	13·86
„ 15 to 39 „ . . .	1,838	349	18·98	2,012	387	19·89
40 years and upwards.	133	44	33·18	138	32	23·18

Most of the published statistics of enteric fever show a slight excess in the female mortality. Of 1,687 male cases in the provinces of France, 227, or 13·4 per cent., died; while of 2,307 females, 336, or 14·5 per cent., died.^u The statistics given by Forget^v and Chomel,^w although on a smaller scale, also make the mortality greater in females; and according to Friedrich^x

^a LOUIS, 1841, ii. 354. ^r BARTHEZ and RILLIET, 1853. ^s DE CLAUVERY, 1849, p. 31.

^t DAVENNE, 1854. See also ZUELZER, 1869, p. 52.

^u DE CLAUVERY, 1849, p. 31.

^v FORGET, 1841, p. 403.

^w CHOMEL, 1834, p. 357.

^x FRIEDRICH, 1856.

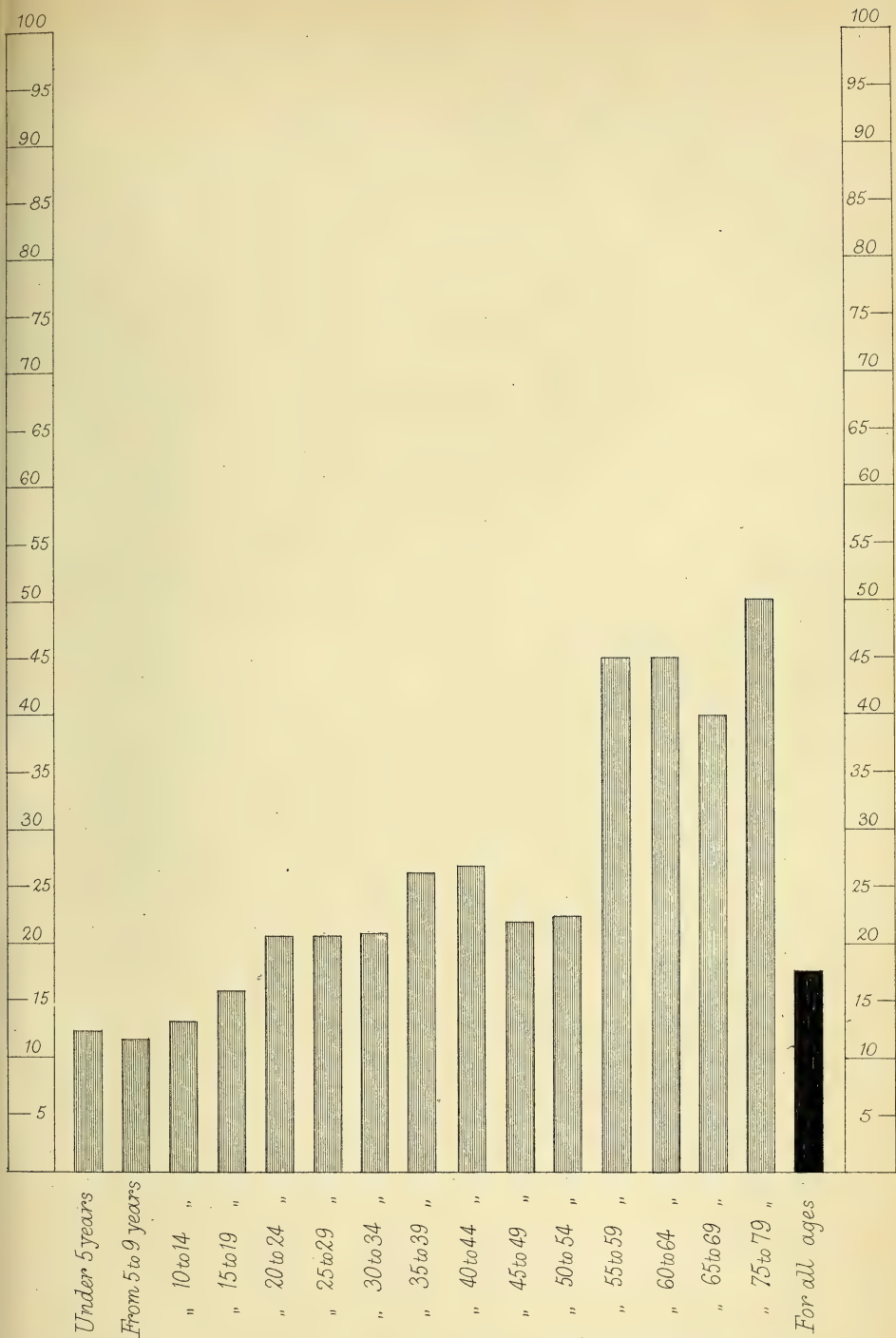


Diagram XIX shows the variations, according to Age, in the rate of Mortality of 5911 cases of Enteric Fever, admitted into the London Fever Hospital. (Compare with Diagr. VIII.) Only 47 of patients were above 55 years.

and Friedleben,⁷ the mortality is greater in girls than in boys. On the other hand, Griesinger has noted a slight excess of mortality among males (males 17·7 per cent.; females 17·0 per cent.);² while in the Glasgow Royal Infirmary, over a period of thirteen years (1857-1869) the male has considerably exceeded the female mortality (males 556 cases, 102 deaths, 18·34 per cent.; females 378 cases, 58 deaths, 15·34 per cent.).³

3. *Months and Seasons.* Table LVIII. shows the rate of mortality, according to months and seasons, of the cases admitted into the London Fever Hospital during twenty-three years (1848-70).

TABLE LVIII.

Months and Seasons	Admissions	Deaths	Mortality per cent.
January	433	81	18·70
February	306	48	15·68
March	318	59	18·55
April	209	41	19·58
May	232	39	16·81
June	335	55	16·41
July	434	79	18·20
August	721	134	18·58
September	803	129	16·06
October	839	135	16·09
November	819	146	17·82
December	539	88	16·32
Spring	759	139	16·99
Summer	1,490	268	17·98
Autumn	2,461	410	16·66
Winter	1,278	217	16·90
Total	5,988	1,034	17·26

From this Table it appears that the mortality was slightly less in autumn, when the disease was most prevalent. This result, however, was far from uniform in different years, and February was the month in which the death-rate was actually smallest. Chomel,^b Forget,^c and Bartlett,^d have endeavoured to show that the mortality in France and America is almost double in the cold months of the year what it is in the warm; but this inference is drawn from a limited number of cases. Of 3,364 cases admitted into the London Fever Hospital during

⁷ *Brit. and For. Med. Chir. Rev.* July 1858, p. 161.

² GRIESINGER, 1864, p. 251.

³ *Hosp. Reports.* But in the City of Glasgow Fever Hospital the mortality has been greater among females.

^b CHOMEL, 1834. ^c FORGET, 1841, p. 410.

^d BARTLETT, 1856, p. 125.

the warm months (May to October) the mortality was 16·97 per cent., while of 2,624 cases admitted during the rest of the year the death-rate was 17·64 per cent.

As regards different years, the death-rate of enteric fever in the London Fever Hospital was much more equable than that of typhus. Thus, while in typhus the mortality in one year was only 8·82 per cent., and in another as high as 60 per cent (see p. 234), in enteric fever it was in no year under 12·82 per cent., or higher than 28·42 per cent.

4. *Station in Life.* Dividing the patients in the London Fever Hospital into three classes, viz. :—1. Paying patients, 2. Free patients and those who have not been in the receipt of parish relief prior to their illness, and 3. Parochial paupers, the mortality of enteric fever in each class during fourteen years (1848–61) was as follows:—

TABLE LIX.

	No. of Cases	Deaths	Mortality per cent.	Mortality per cent. of Typhus.
First Class	281	47	16·72	14·89
Second „	1,454	273	18·77	18·58
Third „	85	13	15·29	27·64

The rate of mortality was not greater among the destitute than in the better classes. In private practice, enteric fever is probably more fatal among the upper classes than among the very poor. Chomel^e and Forget^f both regard debility from destitution a favourable circumstance, as regards prognosis. Enteric fever is as prevalent and as fatal among the rich as among the poor; typhus is not only most prevalent, but most mortal, among the very poor (see p. 241).

5. *Recent Residence in an Infected Locality.* Of 1,787 patients affected with enteric fever who had resided in London more than six months prior to their admission into the Fever Hospital, 279, or 15·61 per cent., died; whereas of 191 patients who had resided in London less than six months, 37, or 19·37 per cent., died. The difference was not accounted for by difference in age. Of 68 patients under Louis and Chomel who had resided in Paris less than six months, 27, or 39·7 per cent., died; whereas of 151 patients who had resided a longer time, 46, or 30·46 per cent., died.^g As far as these figures go, they

^e CHOMEL, 1834.

^f FORGET, 1841, p. 404.

^g LOUIS, 1841, ii. p. 357; CHOMEL, 1834, p. 358.

show that recent residence in an infected locality increases the fatality of enteric fever (see p. 242).

6. *Place of Birth and Race.* Of the patients admitted into the London Fever Hospital during twenty years (1848-67), the mortality, according to birthplace, was as follows:—

TABLE LX.

	No. of Cases	Deaths	Mortality per cent.
English	3,597	591	16.42
Irish	225	18	8.
Scotch	24	4	16.66
Foreigners	41	6	14.63

The small rate of mortality among the Irish is remarkable (see pp. 242, 401).

7. *Intensity of the Poison and Family Constitution.* Several deaths often occur in the same family from enteric fever, whereas many members of other families often recover. This circumstance seems to be partly due to family constitution, for occasionally several members of the same family die of the disease at distant places, and at long intervals; but this explanation is not sufficient, for the remark applies also to members of different families residing in the same house, and it is often found that the mortality is much greater in one village than in another a few miles off. Such observations point to differences in the intensity of the poison (see pp. 495, 553).

8. *Debility* from previous diseases, or from any other cause, has not the same unfavourable effect on the mortality of enteric fever as it has on that of typhus. On the contrary, it has been a common observation on the part of almost every writer who has paid attention to the subject, that the strong and robust succumb more readily to it than the feeble.^h The prognosis, however, is bad in persons who are *very fat*, or have *large muscular development*, whose *habits* have been *intemperate*, or who are the subjects of *gout*, or of *diseases of the kidneys* (see p. 242-3).

c. *Presence of certain Symptoms and Complications.*

With a few exceptions mentioned below, the rules for prognosis laid down under typhus (p. 244) hold good in enteric fever. A few rules may be added, which apply to enteric fever alone.

^h CHOMEL, 1834; FORGET, 1841, p. 404; BARRALLIER, 1861, p. 282.

1. The mode of invasion must not be allowed to influence the prognosis. The disease may set in severely, and yet its subsequent course may be mild, and still oftener the reverse of this observation is made. It must ever be kept in mind that enteric fever is often latent, and that the mildest cases may terminate suddenly in death (p. 588).

2. In all cases, the prognosis is bad in proportion as the morning remissions of temperature are slight and of short duration. A temperature at any time of 105° Fahr. indicates a severe case, although recovery has been known to follow a temperature of nearly 108° . A sudden rise or an irregular range of temperature is always unfavourable, while, on the other hand, a sudden and great fall of temperature may be due to collapse from intestinal hæmorrhage or to some other cause (pp. 517, 526).

3. A fall in the pulse is a less favourable indication than in typhus, as its frequency may vary greatly before the cessation of the fever (p. 519).

4. Perspirations may occur at any stage of the fever, and are not necessarily critical or favourable (p. 518).

5. An abundant eruption does not betoken a grave case as in typhus, and many patients die in whom there has been no eruption (p. 512).

6. Many more patients die in whom the tongue has been at no time dry and brown than in the case of typhus (p. 521).

7. Vomiting early in the attack is not unfavourable, but when it occurs after the fourteenth day it may be the first symptom of peritonitis (p. 522).

8. Diarrhœa is unfavourable in proportion to its severity and duration (p. 524).

9. Abdominal pain and great meteorism are also unfavourable (p. 523).

10. Copious hæmorrhage from the bowels often induces fatal collapse, or is followed by perforation; slight hæmorrhage adds little to the danger, but may become suddenly profuse (p. 527).

11. When peritonitis supervenes, the case is almost hopeless; but in rare instances patients have recovered after all the symptoms of perforation (p. 570).

12. Severe and protracted muscular tremors, especially where the mind is clear, indicate deep and rapid ulceration of the bowel.

13. Sudden collapse is most likely to result from perforation



* *See Étude critique sur la Pathogénie
de la Mort subite dans la Fièvre typhoïde
par le Dr. H. Huchard. - Paris. 1877.*

*He gives references to numerous cases, &
speaks of it as mainly an accident of
convalescence, and as due to extreme
anæmia in conjunction with extreme
weakness or degeneration of the muscular
wall of the heart.*

or from copious bleeding into the bowel, though there be no abdominal pain, and is usually fatal.

14. When coma and congestion of the lungs supervene during the first week, the patient often dies before the fourteenth day (p. 555).

15. Epistaxis is in most cases of little moment; but if profuse, it may be fatal (p. 543).

16. Pregnancy is a less serious complication than is commonly imagined, but the mother usually aborts or miscarries (p. 581).

17. A temporary remission during the second or third week, followed by a return of pyrexia and an aggravation of the other symptoms, often terminates fatally. Louis and Chomel make a similar remark.¹

18. Even after convalescence seems to be fairly established, all cause for anxiety is not removed. A relapse may occur, or the intestinal ulcers, instead of cicatrizing, may give rise to exhausting diarrhœa or hæmorrhage, or may advance to perforation.

d. Mode of Fatal Termination.

As in typhus (p. 247), death may take place by asthenia or by coma, or by a combination of these modes. Coma, resulting from deficient aëration of the blood, or from non-elimination of urinary products, most commonly causes death by the end of the second, or the beginning of the third, week. But death occurs by pure asthenia or anæmia far more commonly than in typhus, and then it may not take place until the third or fourth week, or even later, and is usually preceded by severe intestinal symptoms. Death by sudden collapse, where the previous symptoms have not indicated danger, is also more common in enteric fever. Although this result is usually traceable to hæmorrhage or perforation, I have known it occur during the third week independently of either of these causes, and similar facts have been noted by other observers.² X

¹ LOUIS, 1841, ii. 349; CHOMEL, 1834.

² *Lancet*, 1867, ii. pp. 540, 600.

SECTION XII.—ANATOMICAL LESIONS.

The anatomical lesions of few diseases have been studied with greater care than those of enteric fever. My own observations confirm for the most part those contained in the classical works of Louis, Chomel, Rokitsansky, Jenner, and Hoffmann.^k

Enteric differs from typhus and relapsing fevers in the invariable presence of specific lesions, which are often associated with others of an accidental or less constant character.

a. Generalities.

1. *The Cadaveric Rigidity* is more marked and of longer duration than in typhus. Of 10 cases, where I have noted the circumstance within thirty-six hours after death, there was marked rigidity in all but 1.

2. *Emaciation.* Owing to the lengthened duration of the illness the emaciation is often extreme.

3. *Putrefaction.* There is less tendency to rapid putrefaction of the dead body than in typhus, except in cases where the typhoid state has existed for some days prior to death.

b. Integuments and Muscles.

1. *Discolorations.* Livid discoloration of the integuments on the dependent parts of the body is less common than in typhus, and rarely extends up along the sides of the trunk when the body has been laid on the back. The face is rarely livid, except where there have been pulmonary complications. Discoloration of the integuments along the course of the subcutaneous veins is also rarely observed. Greenish discoloration of the integuments covering the abdomen, within forty-eight hours of death, is also rarer than in typhus. Louis and Jenner noted this appearance in only 6 of 46 cases. (See p. 248.)

2. *The Eruption.* The lenticular rose-spots are never observed on the dead body, although they may have been present in large numbers immediately before death. (See p. 510.)

3. *Sudamina* are not uncommon. Jenner noted them in 4 out of 23 cases. (See p. 515.)

4. *The Muscles.* The changes in the voluntary muscles de-

^k LOUIS, 1841; CHOMEL, 1834; ROKITANSKY, *Path. Anat.* Syd. Soc. Transl. ii. 68; JENNER, 1849 (2); HOFFMANN, 1869.

cribed under the head of typhus are also met with in enteric fever. (See p. 248). As in typhus, I have occasionally observed hæmorrhages and pseudo-abscesses in the substance of the muscles consequent on rupture of their diseased fibres. Zenker found extravasations of blood in the substance of the muscles in 11 cases, and Hoffmann in 11 out of 250 autopsies. Their chief seats are the rectus and transversalis abdominis, the psoas and pectoral muscles.

c. Organs of Digestion.

1. *Pharynx and Œsophagus.* The pharynx is, in many cases, found to be healthy (in 38 of 46 cases by Louis, and in 7 of 15 cases by Jenner), but not unfrequently it exhibits signs of recent inflammation and sometimes distinct ulcers. Louis found recent ulcers in 6 out of 46 cases,¹ and Jenner in 5 out of 15 cases. These ulcers are seated chiefly at the lower part of the pharynx; they have a round, oval, or irregular outline, and they vary in diameter from two lines to three-quarters of an inch. They are usually very superficial, but occasionally their base is formed by the muscular coat. Their edges are not thickened, and the surrounding mucous membrane is either normal or slightly injected. In cases where there is no ulceration, the mucous membrane is occasionally found to be abnormally injected, or coated with diphtheritic false membrane, or the sub-mucous tissue is infiltrated with serum or pus.

The Œsophagus is in most cases healthy; but it occasionally exhibits ulcers similar to those met with in the pharynx (in 7 of 46 cases, Louis; in 1 of 15, Jenner). These ulcers are usually largest and most numerous at the lower, or cardiac, extremity. They may be mere excoriations, or they may penetrate to the muscular coat, but they have never been found to end in perforation.

The ulcers in the pharynx and Œsophagus are never found when death occurs before the third week of the disease. Although they are not met with after death from typhus or from other acute diseases, they must not be confounded with the specific lesions of enteric fever, to which they are secondary. There is no evidence that they are preceded by any morbid deposit like what occurs in the intestines, although statements to this effect are commonly made. Chomel remarks:—‘*Toutes les ulcérations, dont nous avons parlé jusqu’ici, succèdent à une*

¹ LOUIS, 1841, i. 135.

altération des follicules : dans celles dont nous occupons maintenant, cette altération n'a point été constatée; on n'a jamais rien observé dans ces parties d'analogie aux plaques gauffrées ou aux follicules isolés engorgés de l'intestin.^m Louis expresses himself in almost the same terms.ⁿ

2. *The Stomach* is in many cases healthy. The morbid appearances, which it sometimes presents, are increased vascularity, softening, mammillation, and superficial ulcers. These lesions, however, are far from constant, and are observed with almost equal frequency after death from other diseases. Louis pointed out, long ago, that 'typhoid fever' has no more right to be designated *gastro-entérite*, than pneumonia has to be called *gastro-peripneumonie*.

Increased vascularity was noted by Jenner in 5 out of 15 cases, but in 6 cases the membrane was pale. Chomel found the mucous membrane of the stomach in some cases pale throughout.

Softening of the mucous membrane was noted by Louis in 16 of 46 cases; by Chomel, in 14 of 42 cases; and by Jenner, in 5 of 15 cases. This softening is in most cases confined to the great *cul de sac*, but it is occasionally general. Sometimes the membrane is attenuated, as well as softened. In two cases Chomel found the membrane entirely destroyed, fragments only remaining which were readily washed off by a stream of water; while in a third case the softening had extended through the entire coats, over a space the size of a half-crown piece, so that very slight pressure caused it to rupture. This softening of the coats of the stomach is probably nothing more than the result of *post-mortem* digestion. Chomel showed that there was no relation between it and the presence of gastric symptoms during life.

Mammillation of the mucous membrane was observed by Louis in 13 out of 46 cases, and by Jenner in 6 out of 8 cases.

Ulceration is extremely rare. I have never met with it in upwards of 40 cases, in which I have examined the stomach. Chomel failed to find it in any of 42 cases examined by him. Jenner met with it only once in 20 cases; and Louis, four times in 46 cases. The ulcers are not confined to any particular part of the stomach. They may exceed twenty in number, but they are always minute, varying from the size of a pin's head to two or three lines in diameter. They are also

^m CHOMEL, 1834, p. 192.

ⁿ LOUIS, 1841, i. 136.

quite superficial, and are not preceded by any deposit in the mucous membrane. These minute superficial ulcers of the stomach are not uncommon after death from various diseases, especially of the heart or liver, and Dr. G. Budd says that he has several times had reason to ascribe them 'to an excessive use of stimulants, given in the hope of remedying the sense of sinking in the last days of life.'^o (See p. 250)^h

3. *The Duodenum* is in most cases healthy. Sometimes its lining membrane appears abnormally vascular, or its mucous follicles are enlarged; but these conditions were ascertained by Louis to be equally common after death from other acute diseases. In 2 out of 22 cases, Louis found one or two minute superficial ulcers close to the pylorus, similar to those met with in the stomach. There was no ulceration in any of 15 cases examined by Jenner, or in 40 cases dissected by myself.

4. *The Jejunum and Ileum* do not usually contain much gas. On the contrary, the lower part of the ileum is often collapsed and empty. The tympanitis during life is due to the presence of gas in the colon, except in cases where there is peritonitis, when the intestines may be uniformly distended; excluding cases of perforation, Louis found slight tympanitis of the small intestine in only 14 out of 39 cases. The faecal contents are liquid and of an ochrey or orange colour, and they often contain yellowish-brown sloughs detached from the mucous membrane, large quantities of ammoniaco-magnesian phosphate, and occasionally small masses of blood. A considerable quantity of intestinal mucus may be found in the upper part of the small intestine. Louis states that worms (*ascaris lumbricoides*) are often passed by patients labouring under enteric fever, and that he has often found them in the small intestine after death. I have repeatedly known either round or tape worms voided during the attack, and the observation is interesting in connection with some of the names formerly given to enteric fever. (See pp. 419 and 422)^h

In 3 out of 46 cases, Louis found a portion of the small intestine invaginated into the portion below, to the extent of from one to two feet. These invaginations are not accompanied by any signs of inflammation, and are produced in the death-struggle of many diseases in which there is much torpor of the cerebro-spinal system. I have met with them in several cases of enteric fever. (See Case XLVIII. p. 506)^h

^o BUDD, *Dis. of Stomach*, 1855, p. 153.

The colour of the mucous membrane varies. Its vascularity is not necessarily increased. Louis observed it of its natural paleness, or merely tinged with bile, in 17 out of 46 cases; and Jenner, in 11 out of 17 cases. In one-third of Louis' 46 cases, there was increased redness of the mucous membrane. This redness may be either uniform or in patches, and it is almost always most marked towards the lower extremity. When death does not occur until after the third or fourth week of the disease, the mucous membrane often presents a greyish or slate-coloured aspect. Chomel found the mucous membrane of the small intestine infiltrated with a bloody fluid, over a space varying from four inches to three feet, in 7 out of 42 cases. The membrane was much increased in thickness, and presented a gelatinous glistening aspect, and a rose or reddish-black colour. When squeezed, a bloody fluid oozed out, and the membrane regained its natural thickness. This appearance was uniform all round the bowel, and was not limited to the dependent portions of the coils. In most cases there had been intestinal hæmorrhage during life, or blood was found in the intestines after death. I have met with a similar condition in several cases.

As to consistence, Louis found the mucous membrane softened in all except 9 of 42 cases. Chomel noted this condition in only 5 of 42 cases; and Jenner in 3 of 15 cases. Like the softening in the stomach, it is probably a *post-mortem* change,^p although Louis was inclined to think that in certain cases, where it was associated with redness and thickening, it was inflammatory.

None of the above lesions are constant in, or peculiar to, enteric fever (see p. 251). The specific lesions, which are invariably present, and which consist in a disease of the agminated and solitary glands of the ileum, have now to be described.

These lesions present different appearances according to the duration of the illness prior to death. They may be described as passing through four stages, although the disease is often arrested at the end of the first. The stages are:—1. The stage of enlargement of the intestinal glands. 2. The stage of softening and ulceration. 3. The stage of the genuine 'typhoid ulcer'; and 4. The stage of cicatrization. Two or more of these stages may often be traced in the same body; for the

^p See BUND, *Dis. of Stomach*, 1855, p. 46.

morbid process, as well as the process of reparation, always commences at the extremity of the ileum nearest the cæcum, and proceeds upwards.

a. First Stage. This consists in the enlargement of the agminated and solitary glands. Rokitsky maintains that the enlargement of the glands is preceded by a 'congestive stage;' and Trousseau states that enlargement does not commence before the fourth or fifth day of the disease,^a while Louis and Chomel held that it did not commence until the seventh or eighth day. But there is no evidence that the enlargement of the glands is preceded by increased vascularity; while there are facts to show that it commences with the disease, and continues to progress until about the ninth day. In no case, where death has occurred at an early stage of the disease, has there been increased vascularity without enlargement of the glands; and, indeed, in no instance has the latter appearance been wanting. In one case under my care, where death occurred on the sixth day, great enlargement had already taken place (see Case XLVII). Considerable deposition had also taken place in five cases recorded by



Fig. 16.—Lower, ~~three~~ inches of ileum from a case of enteric fever fatal at the end of the second day.

two / L

Bretonneau,^r Forget,^s Bristowe,^t and Hoffmann,^u which were fatal on the fifth day. In Case LVIII., p. 550, where death occurred at the end of the second day, there was also considerable enlargement of the solitary glands, as represented in the annexed woodcut. Lastly, in the cases which occurred at Clapham in 1829 (see p. 472) considerable enlargement was found at the end of the first day. Moreover, in cases fatal at a more advanced stage, it is not found that in the agminated glands at the uppermost limit of the disease there is increased

^a TROUSSEAU, 1861, p. 139.

^r BRETONNEAU, 1829, p. 70.

^s FORGET, 1841, p. 119.

^t *Lancet*, April 28th, 1860; and *Path. Soc.* January 7th, 1862.

^u HOFFMANN, 1869, p. 38.

vascularity without enlargement; while, on the other hand, slight enlargement, without any increase of vascularity, is not uncommon. At all events, mere increase of the vascularity of the agminated and solitary glands, without any enlargement, will not justify the opinion that a patient has died of enteric fever, however short may have been the duration of the illness.

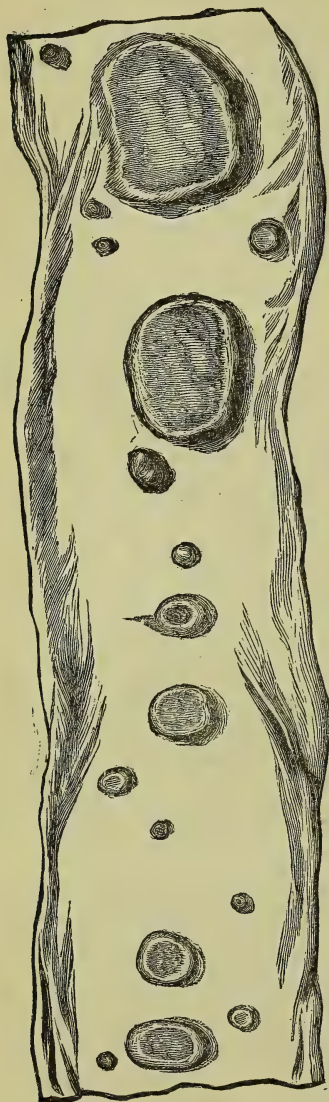
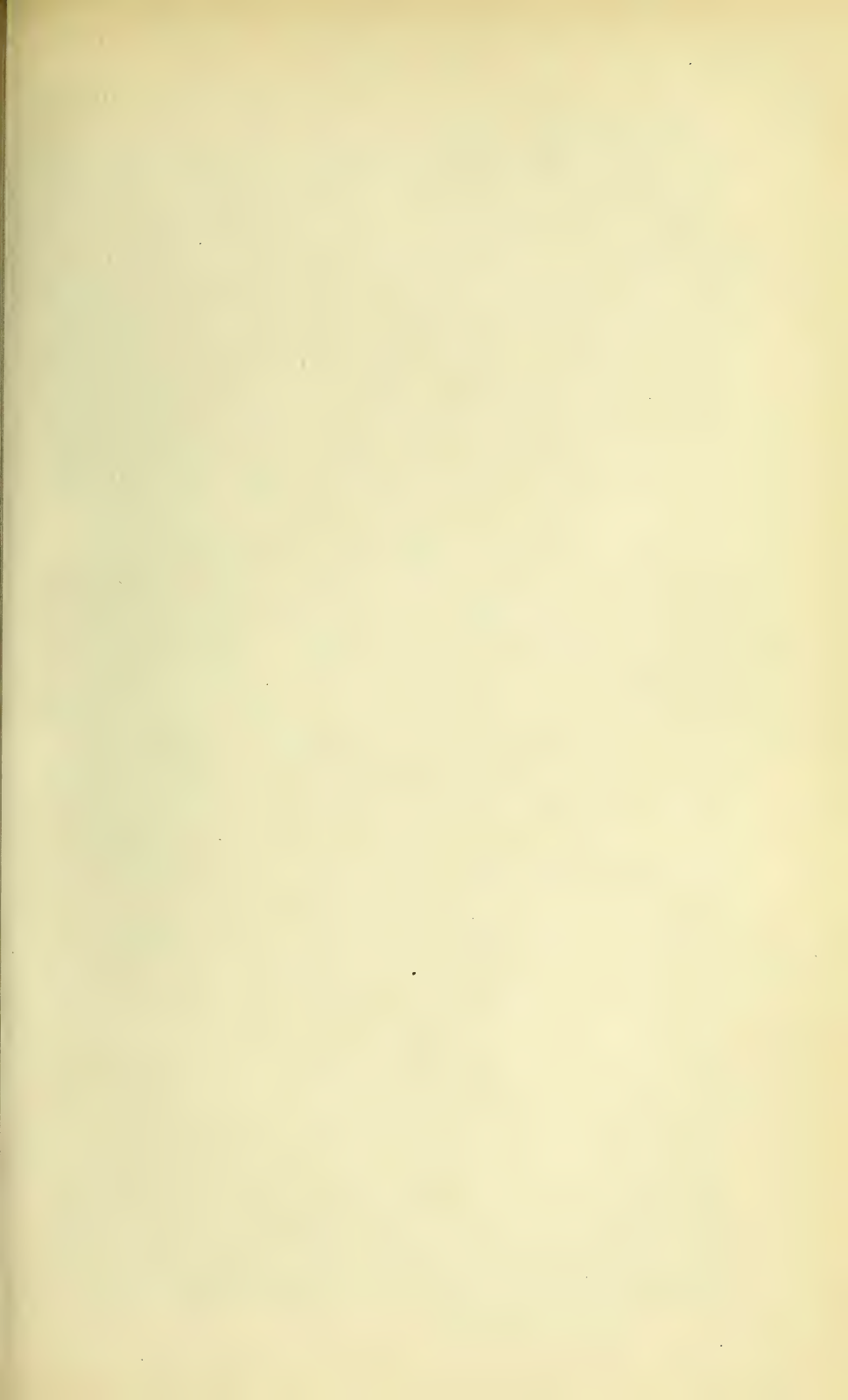


Fig. 17.—Portion of the ileum, from a case of enteric fever fatal on the tenth day, showing the enlarged agminated and solitary glands, not yet ulcerated.

An opportunity is rarely offered of examining the intestines before the eighth or tenth day of the disease. Peyer's patches are then found to be indurated and elevated from half-a-line to two lines above the surface of the bowel (Fig. 17). The membrane covering them is of a pinkish-grey or purplish colour, and is often softened; while that between the diseased patches may have its natural hue, or may present every grade of vascularity up to the most intense injection. The peritoneum corresponding to the patches is usually much injected, and of a bright-red or pale-purple colour. Two varieties of diseased patches have been described by most French writers since the time of Louis. These are the *plaques molles* and the *plaques dures* of Louis; or the *plaques réticulées* and *plaques gaufrées* of Chomel. In the former, the enlargement is comparatively slight, its consistence is soft, and the mucous membrane covering the patch is more or less red, and has a rugose or granular aspect. In the latter, the patch is more elevated, thicker, and harder, and the super-imposed mucous membrane is paler and presents a smoother and more uniform aspect.



Louis was of opinion, that the *plaques dures* were less common than the *plaques molles*. He found them in only 13 of 46 fatal cases, and from the circumstance that they were most common in cases fatal before the fifteenth day he concluded that they constituted a more dangerous form of the disease than the other. The correctness of this opinion may be doubted. At an advanced stage of the disease, after the morbid material has sloughed out, it is impossible to say which of the two forms of the lesion has existed at first. From my own observations, I am inclined to think that in fatal cases the *plaques dures* constitute the more common form in adults. But after all, the differences between the two forms are differences merely of degree; the morbid process is the same in both. Gradations may be observed between them, and they constantly co-exist in the same intestine.*

The solitary glands at the lower end of the ileum are often

* Dr. T. J. MacLagan thinks that there must be a reason why the morbid process should present two distinct forms in the same individual, and has endeavoured to show that the *plaques molles* are always excited by a secondary inoculation with poison thrown off by a *plaque dure*, or, in other words, that the *plaques dures* are primary, and the *plaques molles* secondary, lesions, and that a *plaque molle* can never be found prior to sloughing of at least one *plaque dure*. These secondary lesions he believes to run a more rapid course than the primary (so that at the end of the third week it is impossible to distinguish between the two), and to be the chief cause of hæmorrhage, perforation, and relapses. This view, in his opinion, is necessary to explain why the lesion is always so extensive at the lower end of the ileum (the ileo-colic valve like a sphincter detaining the poison from the primary lesions and so favouring secondary inoculation), why healthy Peyer's patches are not found below those that are diseased, and why the frequency of hæmorrhage, perforations, and relapses is in a direct ratio to a constipated state of the bowels, the retention of the poison given off by the primary lesions favouring the occurrence of those which are secondary but more dangerous. (See T. J. MACLAGAN, 1871.)

In reference to these views I would observe.—1. Minute examination of the *plaques dures* and *plaques molles* shows that the former are merely a more severe form of inflammation of the glands than the latter. In the same bowel the two forms may be seen passing by insensible gradations into one another. 2. When death occurs before ulceration or sloughing, *plaques molles* may be seen interspersed among *plaques dures*, or even, as was long since shown by Louis, without any *plaques dures*. 3. After ulceration, the lesion highest in the bowel is not always, as in the one case examined by Dr. MacLagan, a *plaque dure*, but, according to my observation, is far oftener a *plaque molle*, the disease in fact becoming less intense as we proceed upwards. 4. The concentration of the lesion immediately above the valve is a feature of the disease from its commencement, before ulceration or sloughing, and is not the result of any secondary inoculation. 5. The lesion is not only most abundant, but most advanced in the lower part of the ileum. I have repeatedly known extensive ulceration at the valve, and *plaques molles* not yet ulcerated several feet above it. The reason why healthy Peyer's patches are not found below those that are diseased is that the lesion advances from below upwards, and not from above downwards. 6. In two-thirds of the cases of enteric fever the glands of the colon escape. This exemption, according to Dr. MacLagan, may be due to dilution or neutralization of the poison by the acid secretion of the colon, but the explanation is unsatisfactory. It may be added that in my experience the colic glands have been as frequently affected in cases dying early, as in those dying late in the disease. 7. Although hæmorrhage and perforation may occur in cases where there has been constipation, they are far more common where there has been diarrhoea (see pages 525 and 568). 8. In relapses which are fatal, the fresh lesions may be found higher up in the bowel than those of the primary attack (see pages 554 and 576).

affected in a manner similar to Peyer's patches. Louis found them diseased in 12 out of 46 cases; and, in my experience, the proportion of cases in which they are implicated is even greater. They may be as large as a hemp-seed or a split-pea, or they may be larger; and their pale colour and flattened surface often impart to them an appearance not unlike the pustules of Variola. The diseased solitary glands are usually limited to the lower twelve inches of the ileum, but they may extend higher. In exceptional cases, of which I have seen two, the solitary glands are diseased, while Peyer's patches remain intact. Cruveilhier designated this variety '*forme pustuleuse*.'

The precise manner in which the intestinal glands are affected is a point of some interest, on which different opinions have been expressed. Boehm, in his admirable description of these glands,^w stated that in enteric fever the morbid material was deposited in the sub-mucous tissue external to the glandules, and this view has been commonly adopted.^x On the other hand, John Goodsir, from careful observations concluded that the morbid products were in the first place deposited in the interior of the glandules, which became much distended and ultimately burst, discharging their contents into the sub-mucous tissue.^y Goodsir's observations approach nearest to the truth, but modern means of research have shown that the glandules are not, as was imagined by most physiologists of his day, closed vesicles which periodically discharge their contents into the bowel, but that they are in reality small lymphatic glands. Each glandule is composed of a delicate fibrous reticulum, enclosing lymph-corpuscles in its meshes.^z In enteric fever the proper structure of the gland first becomes enlarged by a proliferation of its cellular elements, and as the process advances the surrounding connective tissue becomes implicated, until, at last, the whole patch becomes converted into a continuous mass of altered gland-tissue. This is what happens in the case of the *plaques dures*. In the *plaques molles* the morbid process stops short of this; the glandules become enlarged, but not to such an extent as to run into one another.

The enlargement of the intestinal glands does not of necessity lead to ulceration. The morbid products to which the enlargement is due may be re-absorbed,^a absorption com-

^w *De Gland. Intestin.* Berol. 1835. ^x See for example, J. HARLEY, 1866, p. 575.

^y GOODSIR, 1842. ^z STRICKER'S *Man. of Histology*, Syd. Soc. Ed. 1870, p. 567.

^a On this subject see CHOMEL, 1834, Obs. 14 and 15; LOUIS, 1841, i. 181; BARTHEZ and RILLIET, 1853, ii. 667; LYONS, 1861, p. 243; TROUSSEAU, 1861, p. 139; AITKEN, *Pract. of Med.* 2nd ed., 1863, p. 396.

See Klein, on Patho. of Enteric Fever
Land. Med. Rev., Oct. 1894.

mencing about the tenth or twelfth day of the disease, and by the end of the third week being complete. This is what probably occurs in those cases already alluded to, where the disease is mild and of short duration (see pp. 547 and 587), convalescence commencing about the middle or end of the second week. According to Aitken, the material in the glands is most often got rid of by the vesicles rupturing 'in the ordinary way,' and discharging their contents into the bowel; but from what has been already stated, it follows that this view is founded on a misconception of the normal structure of the glands. The function of the glands, moreover, is that of absorption, not of secretion or elimination.

b. *Second Stage.* Ulceration of the diseased Peyer's patches may commence in two ways. The mucous membrane becomes softened, and one or more superficial abrasions appear on the surface of the diseased patch, which extend and unite into one large ulcer, and this ulcer proceeds to various depths through the coats of the bowel and even to complete perforation. This is what happens in the case of the *plaques molles*. In the case of the *plaques dures*, the whole of the morbid material in the sub-mucous tissue, as well as the super-imposed mucous membrane, becomes detached in the form of a slough, leaving behind an ulcerated surface. This, according to my observation, is the more common mode. The whole of a diseased patch may slough out at once, or it may slough in successive portions. Occasionally, the sloughing appears to extend at once through the entire coats of the intestine, so as to produce perforation. When death occurs between the twelfth and twenty-first days, the sloughs may be seen loosely attached to the intestinal ulcers, as represented in the annexed figure (Fig. 18). These sloughs have usually a yellowish-brown colour from saturation with bile; occasionally they present a dark, spongy, fungating aspect, from being infiltrated with blood.

It is important to determine at what stage ulceration commences. In fatal cases, this appears to be about the ninth or tenth day, but in this respect there are considerable differences according to the intensity of the morbid process, which is, no doubt, more intense in cases fatal within the first fourteen days of the disease than in those which survive longer. Louis, Chomel, Forget, and Hoffmann each record a case where death occurred on the eighth day, but in none had ulceration commenced, although in Forget's case the agminated glands are



Fig. 18.—Portion of ileum, from a case of enteric fever fatal on the 17th day, showing the partially detached sloughs. The morbid process has advanced further in the agminated, than in the solitary glands. The mesenteric glands are much enlarged.



described as on the point of ulcerating.^b There are several cases on record, where ulceration has been found as early as the ninth or tenth day;^c but it may commence earlier or later. In Case LIX. it had commenced on the seventh day; Louis mentions two cases where it had commenced on the eighth day, and in one of Forget's cases it was found on the ninth day to be very extensive. Cases have been already referred to (p. 567), where the ulceration had advanced to perforation, as early as the eighth or ninth day. Stoll relates a case where extensive sloughs were formed in the ileum as early as the seventh day,^d and Boudet has published minute particulars of a case, fatal at the end of five and a-half days, in which deep ulcers, with partially detached sloughs, were found in the bowel.^e There is reason to believe that in rare cases ulceration may commence as early as the first or second day (see p. 472). On the other hand, of four cases examined by Chomel in which ulceration had not commenced, 2 died on the eighth, 1 on the eleventh, and 1 on the twelfth, day. Louis and Hoffmann each record a case where ulceration had not commenced on the twelfth day, and one has occurred in my own practice. (Case LXI.) The ulceration always commences in the glands nearest to the cæcum; these are often found extensively ulcerated, though ulceration may not have commenced in the glands higher up.^f 8

c. Third Stage. The stage of the 'typhoid ulcer' is that which intervenes between commencement of ulceration and the commencement of cicatrization. It is impossible to fix its limits, as they vary in different patients and in different ulcers of the same bowel. The sloughs may be found detached from the ulcers nearest to the cæcum as early as the fourteenth or fifteenth day, but adherent to the ulcers higher up as late as the third week, or even later. The ulcers may be distinguished from other ulcers of the bowel by the following characters:—1. They have their seat in the lower third of the small intestine, and their number and size increase towards the ileo-cæcal valve. 2. They vary in diameter from a line to an inch and a half. Close to the cæcum, a number of ulcers often unite to form a mass of ulceration, several inches in extent. 3. Their form is elliptical, circular, or irregular. They are

^b FORGET, 1841, p. 122.

^c LOUIS, 1841, ii. 60; HOFFMANN, 1869, p. 39.

^d FORGET, 1841, p. 116.

^e BOUDET, 1846.

^f Chomel records one case, fatal on the tenth day, in which ulceration commenced in the patches farthest from the cæcum, but such an occurrence is quite exceptional (CHOMEL, 1834, obs. 4).

elliptical, when they correspond to an entire Peyer's patch; circular, when they correspond to a solitary gland; and irregular, when they correspond to a portion of a Peyer's patch, or when several ulcers unite to form one. 4. The elliptical ulcers are always opposite to the attachment of the mesentery. They do not form a zone encircling the gut (as may be observed in the tubercular ulcer), but their long diameter corresponds to its longitudinal axis. An elongated ulcer, however, running transversely may result from the confluence of several ulcers originating in the solitary glands, especially in the large bowel. 5. Their margin is formed by a well-defined fringe of mucous membrane, detached from the sub-mucous tissue, a line or more in width, and of a purple or slaty-grey colour: this is best seen when the bowel is floated in water. After the separation of the sloughs, there is no thickening or induration of the edge, as in the tubercular ulcer. 6. Their base is formed by a layer of sub-mucous tissue, by the muscular coat, or by peritoneum. There is no deposit of morbid tissue at the base of the ulcer, although sometimes fragments of the yellow sloughs may be seen adhering both to the base and edges (Fig. 18).

d. Fourth Stage. The cicatrization of the 'typhoid ulcer' takes place in this way:—The surface of the ulcer becomes covered with a delicate shining layer of granulation-tissue, which is dove-tailed, so to speak, between the muscular coat and the detached fringe of mucous membrane. The latter becomes adherent from the circumference towards the centre to the subjacent new tissue, and an epithelial covering is gradually formed over the ulcer. This covering cannot, at first, like ordinary mucous membrane, be moved upon the subjacent coat; but after a time it does become movable, and, according to Rokitansky, it is even coated with villi, but the gland-structure which has sloughed out is of course not regenerated. The resulting cicatrix has the following characters:—It is slightly depressed, firmer, less vascular, and smoother than the surrounding mucous membrane. When held up to the light, the bowel appears thinner at the part. The depressed spot seldom exceeds two or three lines, but may amount to half an inch, in diameter. It is never surrounded by any puckering, and it never causes any diminution in the calibre of the gut. According to Chomel,^s all traces of the ulcers after a short time disappear; but Barrallier^h mentions cases where the

^s CHOMEL, 1834, p. 128.

^h BARRALLIER, 1861, p. 105.

* See W. Greenfield's Reminiscences in
D. Mass. Rep. - Vol. VII.

cicatrized ulcers were distinct at the end of four or five years, and Rokitansky¹ remarks that he has discovered cicatrices answering to the above description thirty years after an attack of enteric fever.

The period between the separation of the sloughs and the commencement of cicatrization varies; but, as a rule, the reparative process does not commence until some time during the fourth week of the disease. The time necessary for the cicatrization of each ulcer is probably about a fortnight. In one case, where the primary fever lasted three weeks, but where death occurred from complications about the fortieth day, I found all the ulcers in the ileum cicatrized. Cicatriza-

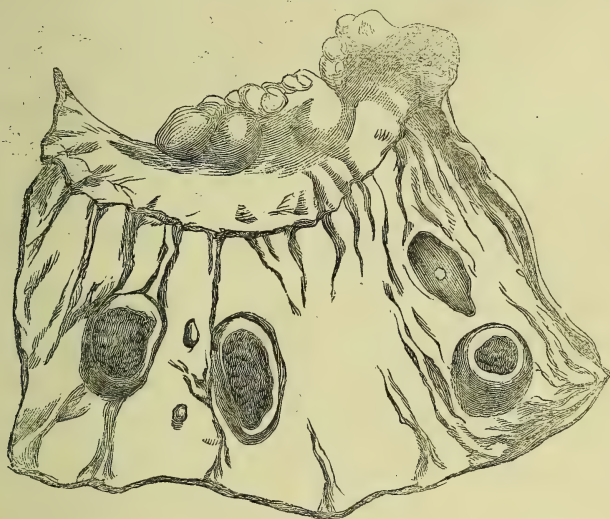


Fig. 19.—Pin-hole perforation in the ileum of a girl aged 10, who died on the 18th day of an attack of enteric fever. The perforation is seen in the centre of the ulcer, on the right hand side of the cut.

tion commences in the ulcers nearest to the cæcum, and proceeds upwards. Consequently, when death occurs in the fourth or fifth week of the fever, the intestine may appear at first sight most diseased one or two feet above the cæcum. As already stated, in cases where death occurs during a relapse, the cicatrices of the first attack may be found co-existing with the fresh deposit and recent ulcers of the relapse (see pp. 554, 576.) But the process of cicatrization is occasionally delayed, sometimes for weeks after the termination of the primary fever. The ulcers become chronic, or, as some pathologists say, *atonic*.

¹ *Op. Cit.* ii. 73.

All ulcers found after the fourth week of the disease not undergoing cicatrization may be regarded as atonic. These chronic ulcers may cause severe diarrhoea, or may advance to perforation. (See pp. 563 and 567).

Perforation. The ulcer of enteric fever frequently extends through both layers of the muscular coat, leaving nothing but the peritoneum, and occasionally the peritoneum itself is perforated. Perforation may take place in three ways. 1. In the first place, it may be due to molecular disintegration, or to an extension of the ulcerative process. The opening is then

Lawson Fig 15, p. 572.
Cut

Fig. 20.—Semilunar perforation formed by the partial detachment of a slough of the peritoneum. *a.* Enlarged mesenteric gland. *b.* Dead, white portion of peritoneum, surrounded by increased vascularity; the opening is seen at lower end. *c.* Flakes of lymph. (See Case *p. 1*).

always minute and rounded, just large enough to admit a pin or a stocking-wire. One or two small perforations of this sort may be seen at the base of the ulcer (Fig. 19). This, in my experience, is the most common mode, having been observed in 15 of 29 cases, in which I have notes on the matter. 2. A considerable portion of the peritoneum may slough, and the perforation may result from the partial or complete detachment of the slough (Fig. 20). This was noted in 10 of 29 of my cases. In this case the opening may be of considerable size, and there are often more than one. In several instances I have found that on opening the bowel, sloughs corresponding

to several entire Peyer's patches and including the peritoneum have fallen out, leaving large oval apertures. Lyons mentions a similar case.¹ 3. The perforation may result from rupture of the denuded peritoneum (4 of 29 cases). Some observers have doubted if this ever occurs, but the elongated linear appearance of the opening in certain cases admits only of this explanation. Bristowe, indeed, thinks that the perforation is, in most cases, due to laceration;^k and this mode of perforation may account for the circumstance that perforation ~~has been observed~~ *is common* in cases of a latent character, where the patients have not been sufficiently prostrate to confine them to the recumbent posture (Fig. 21).^l

In the majority of cases the perforation is in the ileum;



Fig. 21.—Perforation produced by rupture of the denuded peritoneum.

more rarely it is in the appendix vermiformis (Case LXXII), or in the colon (Cases LXXIII. and LXXIV). Of 10 cases collected by Louis, the opening was in the lower foot of the ileum in all. Of 39 cases in which I have noted the situation of the perforation, it was in the ileum in 34; in the appendix vermiformis in 1, and in the colon in 4. Morin, in his memoir, has tabulated 64 cases collected from different sources with somewhat different results. Of the 64 cases, the perforation was in the jejunum in 2; in the ileum in 36; in the appendix vermiformis in 12; and in the colon in 14.¹ Of my 34 cases where the perforation was in the ileum, in 27 it was within twelve inches of the ileo-colic valve; in 6 it was between twelve and twenty-four inches above the valve; and in 1 it

¹ LYONS, 1861, p. 245.

^k BRISTOWE, 1860, p. 113.

^l MORIN, 1869, p. 37. The large proportion of perforations of the appendix vermiformis suggests the question whether all of them were examples of enteric fever.

was thirty inches above the valve. I have never met with a perforation higher than this; but Bartlett mentions a case where it was as high as 44 inches,^m and Bristowe another where it was 72 inchesⁿ above the valve, while Morin cites two instances of enteric fever, one on the authority of Lebert, in which a perforation was found in the jejunum. The perforation has also been known to occur at the apex of a diverticulum ilei.^o Of my 4 cases of perforation of the colon, the opening was in the cæcum in 1, at the junction of the ascending and transverse colon in 1, and in the sigmoid flexure in 1; while in the fourth there was one perforation in the cæcum and 2 in the sigmoid flexure. Of 14 cases of perforation of the colon collected by Morin, it was situated in the cæcum in 2; in the ascending colon in 7; in the transverse colon in 1, and in the sigmoid flexure in 4.^p

As to the number of perforations there was only one in 28 of my cases; two in 5; and three in 4 cases. Occasionally they are more numerous, and Hoffmann has recorded a case in which there were more than twenty-five of them.^q

When the perforation is large, several pints of fæcal matter and even intestinal worms may be found in the peritoneal cavity; but more commonly the contents of the bowel are prevented escaping into the peritoneum in large quantity by surrounding adhesions, and the peritonitis has a tendency to be circumscribed. The perforation also, when small, is sometimes closed by lymph, as if undergoing a spontaneous cure. Circumscribed peritoneal abscesses occasionally result from perforation, which may induce ulceration or sloughing of the parietal peritoneum, or may even open externally into another portion of the intestinal canal, and after the discharge of the matter in any of these ways recovery may take place (see p. 570). In rare instances, perhaps, such an abscess may open into the gall-bladder, or urinary bladder.^r

^m BARTLETT, 1856, p. 79.

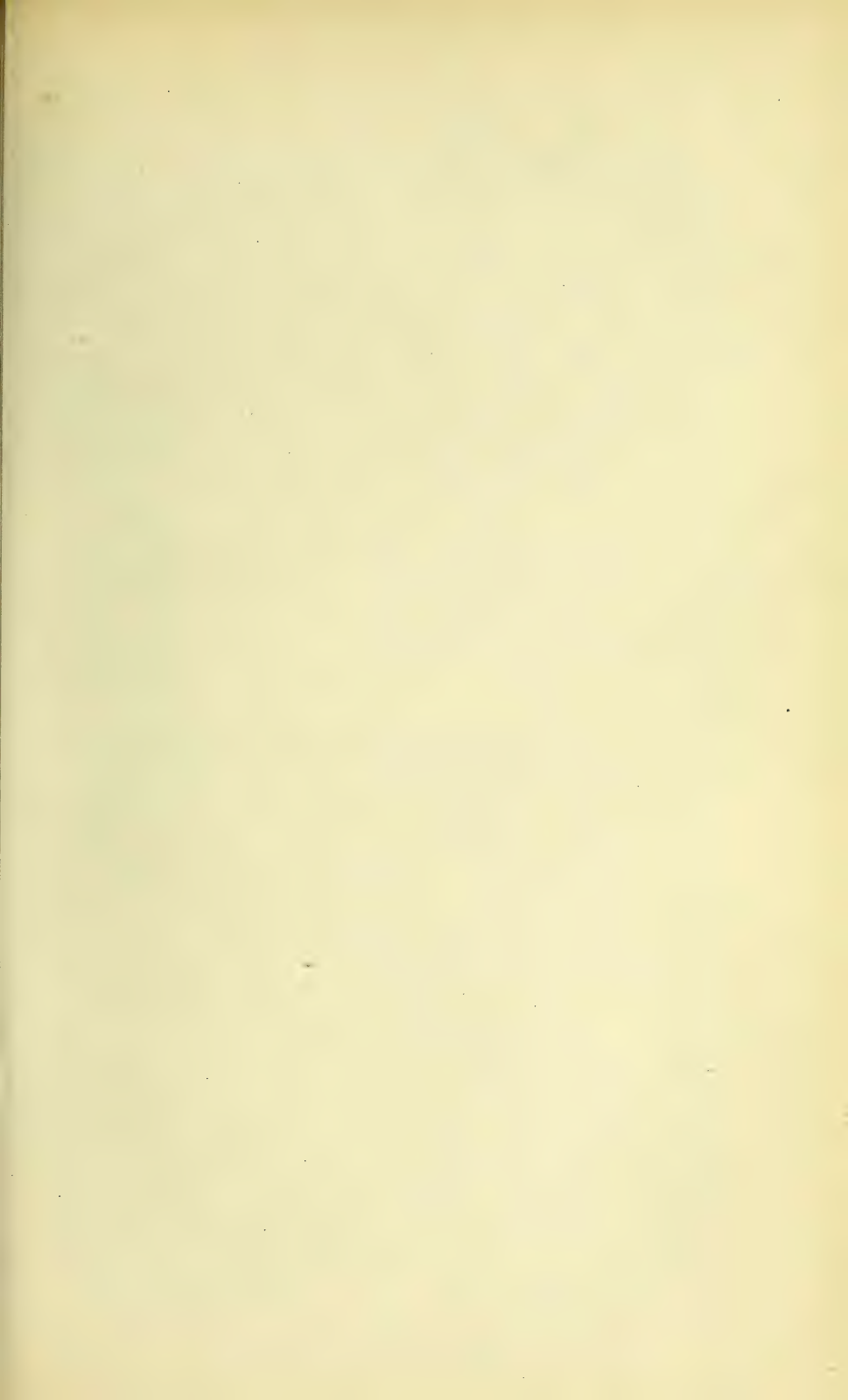
ⁿ BRISTOWE, 1860, p. 113.

^o *Path. Trans.* vol. xxiii, p. 103.

^p For other examples of perforation in the colon, see *Path. Trans.* ix. 199, and xiii. 65.

^q HOFFMANN, 1869, p. 121.

^r In the *Path. Trans.* (vol. xiii. p. 65), I have recorded a case where such an abscess opened into the sigmoid flexure, and a second case (vol. xix. p. 226) where it opened into the cæcum. In Case LXXIV. (p. 578), one can easily conceive that the abscess might have ultimately opened into the gall-bladder. Lastly, a case has been communicated to me of a gentleman, aged 60, in whom an attack of 'typhoid fever' with diarrhoea, slight intestinal hæmorrhage, and 'several crops of eruption,' was followed by a discharge of fæces and a thin piece of bone per urethram. The patient recovered, but there were some reasons for doubting whether the case was not one of Typhlitis rather than enteric fever.



The extent of the intestinal disease in enteric fever varies greatly in different cases. The number of diseased Peyer's patches may vary from two or three to thirty or forty. At the upper part, the transition between the diseased and the healthy patches is usually rather abrupt; and proceeding downwards, after the first diseased patch all are usually diseased, but the morbid process is always farther advanced the lower we go down. An extensive mass of disease is usually found at the lower end of the ileum, terminating abruptly at the valve. There is no relation between the extent of the disease of the intestinal glands and the severity of the cerebral or abdominal symptoms (see pp. 524 and 531); but where there has been excessive diarrhoea, there are usually signs of extensive inflammation of the mucous membrane, or ulceration of the glands.

The intestinal lesions are the same in children as in adults. Extensive deposit, however, in the submucous tissue, followed by sloughing of the diseased patches in large masses, is less common. The solitary glands, also, have a greater tendency to be attacked, and extensive ulceration, or perforation, is said to be comparatively rare (see p. 567).

The morbid appearances presented by the agminated and solitary glands of the ileum, above described, are constant in, and peculiar to, enteric fever. They characterize neither typhus, nor any other disease. '*Il faut,*' says Louis, '*non seulement la considérer comme propre à l'affection typhoïde, mais, comme en formant le caractère anatomique, ainsi que les tubercules forment celui de la phthisie.*'^a But care must be taken not to set down every unusual appearance of the parts in question to enteric fever. 1. In young children, Peyer's patches are naturally more distinct than in adults; but this condition bears no resemblance to that resulting from enteric fever. 2. The appearance likened by French pathologists to a shaven beard is now well known not to be characteristic of enteric fever, but to be met with after death from many diseases, and even to be compatible with perfect health. This circumstance was pointed out forty years ago by Chomel,^c and has been insisted on by many subsequent observers.^b The appearance in question is simply the result of pigmentary deposit. 3. The agminated and solitary glands of the ileum may be the seat of

^a LOUIS, 1841, i. 199.

^c CHOMEL, 1834, p. 149.

^b JENNER, 1853, p. 287; JACQUOT, 1858, p. 252; BARRALLIER, 1861.

tubercular deposit and ulceration ; but I am surprised that experienced pathologists like Dr. J. Harley^v and Dr. H. Kennedy^w should be unable to distinguish the tubercular ulcer, with its edges and base indurated from deposit of tubercle, from the ulcer of enteric fever already described. 4. The appearances, which are most likely to be mistaken for the lesions of enteric fever are those which are occasionally met with after death from cholera, variola, scarlatina, erysipelas, and pyæmia. In these diseases, the solitary and agminated glands are occasionally found slightly thickened and elevated. The enlargement, however, is always slight ; it does not pass through the successive stages observed in the lesions of enteric fever ; it very rarely produces ulceration ;^x and it is not accompanied by enlargement of the mesenteric glands.^y These are not the lesions of enteric fever in an early stage, for they are not found any more advanced, when death does not occur until the twentieth or thirtieth day of the illness. Moreover, they are only present in exceptional cases of the diseases in question ; whereas, the lesions above described are never absent in enteric fever. At the same time, the possibility must be borne in mind of enteric fever coexisting with the diseases just mentioned. (See pp. 453 and 583.) Such combinations do not justify the doctrine that the transition from scarlet to enteric fever is but a natural pathological sequence, or that the lesions of enteric fever may become a part of any other acute disease. The recent enunciation of this doctrine appears to me to be a retrograde step in pathology. (See p. 453.)

5. *The large Intestines.* The colon is in most cases more or less distended with gas, and sometimes to such an extent that it forms numerous coils, which obscure and displace the other viscera. Louis mentions a case in which the liver was displaced in this way so high, that the hepatic dulness was mistaken during life for pneumonia. The mucous membrane of the colon presents the same varieties as to colour and consistence, as were observed in the small intestine. These abnormal appearances are common in many other diseases than enteric fever.

The solitary glands of the colon are enlarged or ulcerated, like those of the ileum, in one-third of the cases which are fatal. This was found to be the case in 14 out of 46 cases observed by Louis, in 7 out of 20 cases by Jenner, and in 184 out

^v J. HARLEY, 1873. ^w H. KENNEDY, 1873. ^x ANDERSON, 1861, p. 115.

^y ROKITSANSKY, *Path. Anat.* Syd. Soc. Transl. ii. 89.

See Dr. Greenfield's Remarks on the
New Hope Reg. Vol. VI.

of 539 observed or collected from different German sources by Hoffmann. As a rule, the disease is confined to the cæcum and ascending colon, but it may reach as far as the sigmoid flexure. The ulcers are usually small and round, but they sometimes measure fully an inch and a half in length, and then their long diameter is transverse, corresponding to the folds of the gut. In exceptional cases the disease is more extensive in the large intestine than in the small, and Hoffmann has recorded one case in which it was restricted to the large bowel.*

The lesions of dysentery occasionally coexist with those of enteric fever (see p. 563).

6. *The Mesenteric Glands* are invariably enlarged,^a but their appearance varies according to the stage of the disease at which death occurs. They begin to enlarge at the very commencement of the ~~disease~~ (see p. 613), and go on increasing in size, contemporaneously with the intestinal glands, until about the twelfth or fourteenth day ~~of the fever~~. At this time, they are sometimes found equalling or exceeding a pigeon's egg in size, their consistence is tolerably firm or slightly softened, and their colour is rosy-red or purplish. As soon as the morbid material begins to be detached from the intestinal glands, the mesenteric glands usually decrease in size, and become softer; but they are found to be considerably larger than natural as late as the thirtieth day, or later. When death does not occur until after the sixth week, they are often unusually small, shrivelled, tough, and either very pale, or of a grey or bluish colour. In cases, however, where death is due to a relapse of the primary fever, many of them may be found enlarged, as late as eight or twelve weeks from the first commencement of the illness (see pp. 553 and 621).

The minute structure of these enlarged glands resembles that of the glands in the bowel to be presently described. In some instances, when a section of one of the glands is examined about the twelfth or fourteenth day, small circumscribed masses of opaque, pale-yellow, friable material may be observed. After a time, these masses become softened at their edges into a fluid resembling pus, and then, on cutting across the gland, a number of little drops of puriform fluid may be seen, each with a central yellow slough. In rare cases, an entire gland may become converted into a collection of puriform matter, as large

* HOFFMANN, 1869, p. 85.

^a Hence the designation 'Febris mesenterica,' applied to the disease by many writers. (See pp. 419, 422, 426b)

as a walnut, in the centre of which are detached sloughs of considerable size. These pseudo-abscesses are usually formed in one of the glands at the termination of the ileum, and they may be found as late as the sixth or eighth week of the disease. Now and then, they may be seen with nothing more than a thin layer of peritoneum separating their contents from the abdominal cavity, and occasionally they burst through the peritoneum and excite general peritonitis^b (see p. 564), but more commonly they slowly desiccate into a cheesy or calcareous mass.

The morbid changes now described are usually most marked in the glands corresponding to the most diseased portions of the bowel, or to the lower end of the ileum. From this situation they gradually diminish in size as we proceed upwards. The mesocolic glands are also enlarged in cases where the mucous membrane of the colon is diseased. Still, the enlargement of the mesenteric glands is not merely the result of intestinal irritation, but must be viewed as a primary anatomical lesion, like that of the intestinal glands. In 10 of Louis's 46 cases, there were diseased mesenteric glands corresponding to perfectly healthy portions of intestine; while in another patient, who died on the eighth day of the disease, the mesocolic glands were enlarged and softened, although the mucous membrane of the colon was perfectly healthy. Moreover, as above stated, it is probable that the mesenteric glands become enlarged as early as those in the intestine. (*Case LVIII*, p. 550)

The glands in the fissure of the liver, the gastric, œsophageal, lumbar, and inguinal glands, are occasionally found enlarged; but these enlargements are usually due to irritation from ulcers in the stomach or œsophagus, from erysipelas, or from blistered surfaces on the legs.^c

7. *The Spleen* is almost always found to be hypertrophied when death occurs before the thirtieth day. Of 35 cases, in which death occurred before that date, I found the spleen enlarged in all but one: its normal weight being $4\frac{1}{2}$ ounces, the average of 30 cases was $12\frac{1}{4}$ ounces; the largest weighed 20 ounces. On the other hand, in 15 cases where death did not take place until after the thirtieth day, the average weight of the spleen was only 5.9 ounces. In 11 cases where death occurred before the thirty-fifth day, Jenner found the average weight of the spleen to be 10 oz. 3 dr. avoird.; the smallest

^b See LOUIS, 1841, i. 240; JENNER, 1849 (2); ROKITANSKY, *Path. Anat.* Syd. Soc. Transl. ii. 78.

^c See LOUIS, 1841, i. 254.

was 6 ounces, and the largest 14 ounces. Louis found the spleen enlarged in at least 36 out of 46 cases, and in 17 it was three, four, or five times its normal size; most of the cases in which it was not enlarged were fatal after the thirtieth day. Of 117 cases fatal within the first four weeks and examined by Hoffmann, the spleen was enlarged in 95. The enlargement is usually greatest in persons under thirty years of age; this difference according to age may account for the circumstance that the organ is larger in enteric fever than in typhus.

The consistence is at first firm, but in the advanced stages of the disease it is usually reduced. Louis found the spleen softened in 34 out of 46 cases; and in 7 it was reduced to a mass of 'putrilage.' It was decidedly softened in 4 out of 14 cases examined by Jenner, and in 23 out of 52 cases dissected by myself. According to Rokitansky, the enlarged softened spleen is liable to spontaneous rupture.

The colour is usually at first dark purple, but in the advanced stages it becomes paler.

Infarctions are occasionally met with in the spleen. I have noted them twice in 61 cases, and Hoffmann found them in 9 of 250 cases at Bâle. They are liable to soften into a puriform fluid and may then excite peritonitis. (See p. 564.) They have been erroneously thought to consist of a material similar to what is deposited in the intestinal glands; but they exactly resemble the so-called 'embolic masses' met with in typhus, relapsing fever, and other diseases.

8. *The Liver and Gall-bladder.* The liver is occasionally hyperæmic: it was so in 8 out of 46 cases examined by Louis, in 2 out of 15 dissected by Jenner, and in 3 out of 12 cases noted by myself; but in most cases its colour is normal, or it is unusually pale. The organ was softer than natural in 32 out of 73 cases examined by Louis, Jenner, and myself. This softening is often associated with an indistinctness of the outlines of the lobules, while the microscope shows that the secreting cells are loaded with pigment and oil-granules, or are undergoing disintegration. Similar microscopic appearances may be seen in many cases even when the organ is not obviously softened. In advanced stages of the disease Hoffmann has found many of the hepatic cells of large size and containing several nuclei. Frerichs has met with cases in which the liver was in a state of acute atrophy, and he remarks that it not unfrequently contains leucine, tyrosine,

and other products of disintegrated tissue.^d Louis and Frerichs each record a case where the liver contained a number of circumscribed pyæmic deposits,^e and a case of acute hepatic abscess in enteric fever is also referred to by Hudson.^f In one instance I found the liver to contain an opaque yellow mass the size of a pigeon's egg, apparently due to embolism.^g Emphysema of the liver in conjunction with emphysema of the subcutaneous areolar tissue has been observed by Dr. J. F. Meigs^h of Philadelphia (vide ante p. 558).

The lining membrane of the gall-bladder is very liable to become inflamed in enteric fever, without producing any marked symptoms during life. Illustrative cases have been recorded by Andral,ⁱ Louis,^j Budd,^k Rokitansky,^l Frerichs,^m &c. The inflammation assumes different forms. Sometimes it is catarrhal, and the gall-bladder is found to contain pus, as in three cases recorded by Louis and in several which have occurred in my own practice. At other times, according to Rokitansky, it is diphtheritic, and the gall-bladder and biliary passages are found lined with tubular investments of exudation, which may block up the latter, and cause dilatation of the smaller ducts. Thirdly, it may take the form of ulceration: cases where the mucous membrane has been found ulcerated have been recorded by Andral, Jenner,ⁿ and Trousseau;^o and instances have been already referred to, where the ulceration ended in perforation and fatal peritonitis (see p. 564). There is no evidence that these morbid conditions of the gall-bladder are due to any morbid deposit, like that in the intestinal glands. As Frerichs has shown, they are met with in other febrile diseases besides enteric fever.

In a large proportion of cases, where the disease has lasted for three or four weeks, the bile is thin, watery, almost colourless, and of low specific gravity (1010–1016, instead of 1026–1030). These characters have been noticed by many observers; but I have rarely, if ever, met with them in typhus. According to Martin Solon, the contents of the gall-bladder, when they present the appearances now described, are of acid reaction.^p

9. *The Pancreas* is usually healthy, but occasionally it is of

^d *Dis. of Liver*, Syd. Soc. Transl. i. 215.

^e LOUIS, 1841, i. 118; FRERICHS, *Op. cit.* i. 172.

^f HUDSON, 1867, p. 96.

^g *Trans. Path. Soc.* vol. xv. p. 132. See also BUDD, *Dis. of Liver*, 3rd ed. p. 169.

^h *Lancet*, Dec. 7th, 1872.

ⁱ *Clin. Méd.* 4me. éd. ii. 549.

^j LOUIS, 1841, i. 281.

^k *Dis. of Liver*, 3rd ed. p. 195.

^l *Path. Anat.* Syd. Soc. Transl. ii. 160.

^m *Op. cit.* ii. 454.

ⁿ JENNER, 1849 (2).

^o TROUSSEAU, 1861, p. 203.

^p SOLON, 1847.

Diseases of Liver after Typhloidal Fever. By G. Chester.

Brit. Med. Journ. Nov. 15. 1873.

Lancet, Oct. 17. 74.

a rosy or livid hue from hyperæmia, or its consistence is reduced.

10. *Peritoneum*. From the remarks already made, it is obvious that recent peritonitis is far from being an uncommon lesion in enteric fever (see pp. 563, 566).

d. Organs of Circulation and Blood.

1. *The Pericardium* is usually healthy. Occasionally it contains a few drachms of serous fluid; but out of 84 cases noted by Louis, Jenner, and myself, in only one (Louis) was the fluid of a sanguinolent hue; and in only one (Jenner) did it contain shreds of lymph, indicative of recent pericarditis (see p. 256).

2. *The Heart*. Softening of the muscular tissue of the heart similar to what is observed in typhus is very common after death from enteric fever. Rokitsky observes, that, although it may be flabby and pale, it is free from 'that softening of its substance, described by Stokes as occurring in the typhus fevers of Ireland;' but this statement is now known to be an error, although extreme softening is certainly less frequent than in typhus. Louis found marked softening, sometimes associated with thinning of the walls, in 15 out of 47 cases. Jenner found the heart soft, and flabby, or flabby only, in 6 out of 11 cases; and Chomel noted marked softening in 7 out of 30 cases. As in typhus, the softening may extend over the whole heart, or it may be limited to the left ventricle. Zenker has shown that the softening is due to similar changes to those which he has found in the voluntary muscles (see pp. 249, 256), and Hoffmann has discovered either waxy or granular degeneration of the muscular tissue of the heart in 103 out of 159 cases.

3. *The Endocardium* presents a dusky-red discoloration more rarely than in typhus. Jenner noted this appearance in only 3 of 16 cases, and in all it was slight (see p. 257). According to Hoffmann the endocardium is often opaque and thickened, owing to a fatty degeneration of its lining epithelium, and in several instances he has found recent endocarditis, with vegetations on the aortic or mitral valves.

4. *The Vessels*. Hoffmann has made the important observation that the minute arteries of the brain, kidneys, and other organs are often in a state of extreme fatty degeneration.

5. *The Blood*. A dark, liquid condition of the blood is rarer

than in typhus, and firm white coagula are more common. Louis found white coagula in the heart in more than one-half of his cases. Out of 14 cases Jenner found the blood fluid in 3, and coagulated into pale fibrinous clots in 10. Of 9 cases noted by myself, the blood in the right side of the heart contained pale fibrinous clots in 6; in 1, it resembled currant jelly; and in 2, it was dark and fluid. On the other hand, Chomel found the blood black and fluid in 15 out of 30 cases, and containing fibrinous clots in only 6. There is a close relation between the condition of the blood and the symptoms during life. When death has been preceded for some days by the typhoid state (see p. 531), the blood is usually dark and fluid; in other cases, as for example when death is due to perforation or pneumonia, it often contains fibrinous coagula.

Lehmann states, that during the first week of enteric fever the blood resembles that of plethora, the corpuscles and solids of the serum, especially the albumen, being increased, but that from about the ninth day the corpuscles and the solids of the serum diminish with a rapidity proportionate to the intensity of the intestinal affection.^a Virchow maintains that the number of white corpuscles is always increased, while the fibrine is diminished. The increase of the white corpuscles he attributes to the enlargement of the mesenteric and Peyerian glands.^b He and other observers have also discovered in the blood of enteric fever and of other typhoid diseases minute reddish-black bodies, smaller than red corpuscles, which they regard as red corpuscles undergoing disintegration.^c Virchow's observations have been confirmed by Hoffmann, who has found white corpuscles and pigment-granules in large numbers in the blood, especially in that of the portal vein. (See p. 16.)

e. *Organs of Respiration.*

1. *The Epiglottis* was found by Louis to present signs of recent inflammation in 10 out of 46 cases. It was cedematous, congested, ulcerated, or covered with false membrane. In all of the cases, death occurred at an advanced stage of the disease.

2. *Larynx and Trachea.* The various forms of inflammation to which the larynx is liable, in the course of enteric fever,

^a *Physiol. Chem.* DAY'S Transl. ii. 266.

^b *Cellular Path.* CHANCE'S Transl. p. 167.

^c *Ibid.* p. 225.



have been already alluded to (p. 557). It is only necessary now to add a few words concerning that form, in which the mucous membrane is found to be ulcerated. This lesion seems to vary greatly in frequency at different places. I have only met with it in three or four instances. ~~Louis met with it in only 3 of 96 cases; Chomel, in 1 of 42 cases; and Jenner, in 1 of 15 cases, examined after death.~~ On the other hand, ~~Rokitansky observes that 'secondary pharyngeal typhus occurs much more rarely than secondary laryngeal typhus,' although~~ ^{and} ~~Louis and Jenner found ulcers in the pharynx and œsophagus to be far more common than ulcers in the larynx (see p. 609); and~~ ^(u) ~~Griesinger found laryngeal ulcer in 31 out of 118 autopsies,~~ ^(t) ~~The ulcers in the larynx are usually situated near the posterior junction of the vocal cords. They are sometimes superficial; at other times, they spread by sloughing, and are so deep as to destroy the subjacent cartilages, or perforate the larynx, permitting air to escape into the cellular tissue (see p. 558). They are rarely found before the fifteenth day of the disease. Like the ulcers in the pharynx and œsophagus (see p. 609), there is no evidence that they are due to the sloughing out of any morbid material ('typhous matter') deposited in the sub-mucous tissue. When we remember the remarkable tendency to ulceration exhibited by the pharynx, the œsophagus, the stomach, and the gall-bladder, in the advanced stages of enteric fever, it is not surprising that inflammation of the larynx should occasionally lead to the same result. Trousseau says that laryngeal ulcers are most common in persons who have been kept on too low diet, and he quotes the experiments of Chossat, to the effect that the production of ulceration is one of the effects of inanition. Moreover, ulceration of the larynx is occasionally found in typhus (p. 259). Trousseau justly observes: 'Ces lésions s'expliquent sans qu'il soit besoin d'invoquer une localisation spéciale de la maladie, analogue à celle qui se fait du côté de l'intestin.'~~ ^(c)

3. *The Bronchi* are often filled with frothy mucus, while their lining membrane is much congested; but these appearances are, on the whole, less common than in typhus (see p. 259).

4. *The Lungs* are occasionally found healthy, especially when death takes place suddenly by peritonitis; but in most cases,

u | † *Op. cit.* ii. 79.

t † GRIESINGER, 1864, p. 211.

† TROUSSEAU, 1861, p. 203.

| u

they exhibit one or other of the morbid conditions described under the head of typhus.

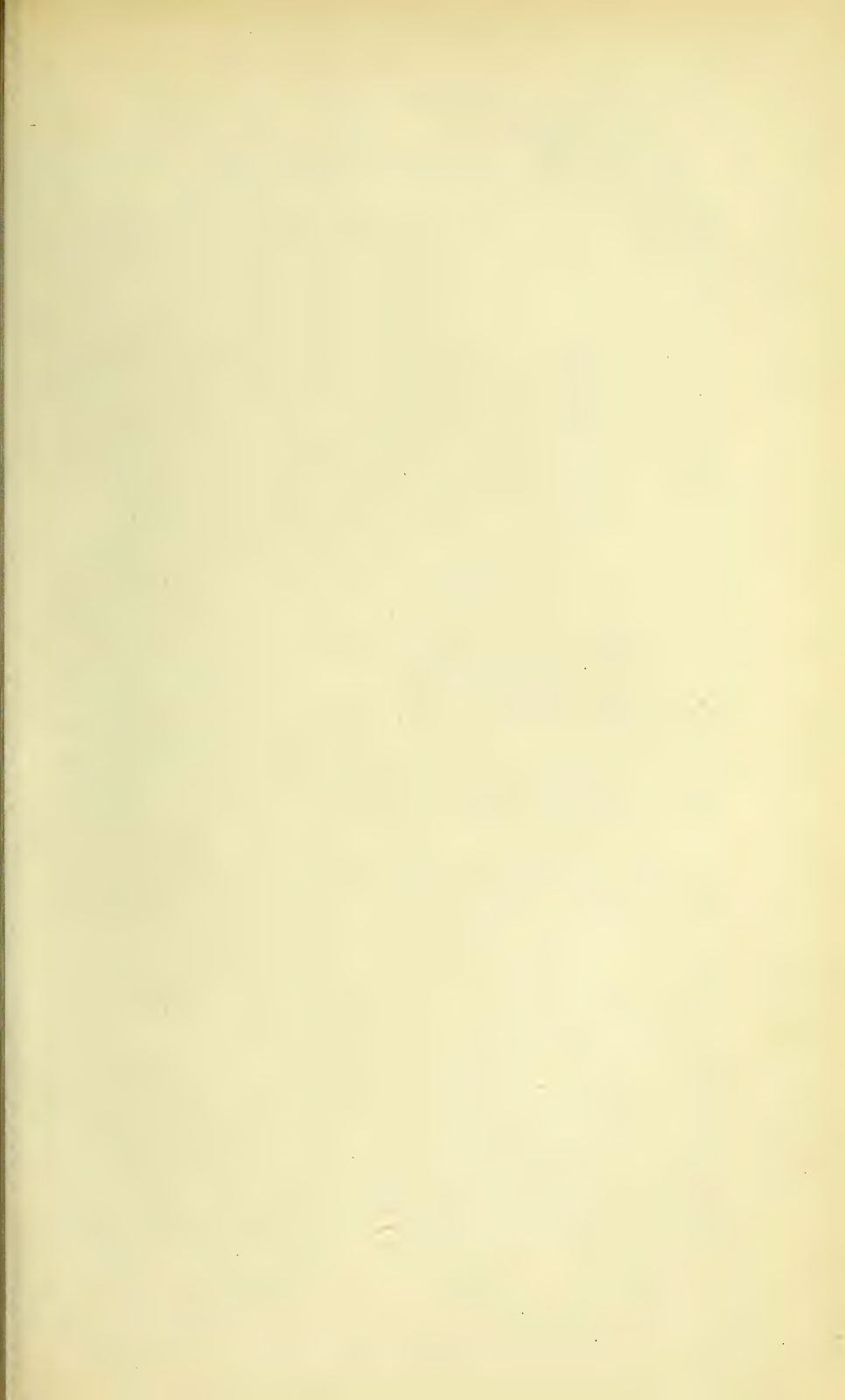
Hypostatic consolidation is less common than in typhus. Jenner did not observe it in any of 15 cases. I have noted it, however, in 7 out of 19 cases; and in 4 of the 7 cases, the consolidation was so great that the most dependent portions of the lungs sank in water. In all of the 7 cases the typhoid state had been well-marked prior to death. Louis also noted hypostatic condensation in 19 out of 46 cases. He applied to it the designations 'splénisation ou carnification,' (terms which are now given to two entirely different lesions); but he accurately described its characters, and its points of distinction from true pneumonia. Thus, it was limited to the most dependent portions of the lungs; its cut surface was non-granular and discharged, when squeezed, a quantity of reddish serum without any bubbles of air; and the condensed tissue not only sank in water, but was more tenacious than in the natural state (see pp. 142 and 259).

(Edema of the lungs is occasionally met with, and, according to my observations, is most common in the upper lobes (see p. 259).

True pneumonia is much more common than in typhus. It existed in 8 out of 19 cases noted by myself; in 17 out of 46 cases examined by Louis, and in 12 out of 15 cases dissected by Jenner. It is usually lobular. Hoffmann found lobar pneumonia in 18, and lobular pneumonia in 38 of 250 autopsies. In several instances I have known the circumscribed patches of lobular pneumonia become converted into small abscesses, or pass into gangrene. Similar appearances may sometimes be traced to hæmorrhagic infarctions of the lungs, consequent on embolisms of the branches of the pulmonary artery. I have never met with any appearance to justify the appellation of *typhoid pneumonia* on anatomical grounds. It has been stated that the exudation thrown out into the lungs sometimes presents the same minute structure as the matter deposited in the intestines, but the intestinal deposits themselves have no peculiarity of structure by which they can be recognized.

Recent tubercle is occasionally met with in the lungs in protracted cases of enteric fever (see p. 556).

5. *The Pleuræ* exhibit signs of recent inflammation oftener than in typhus. Recent adhesions or effusion of lymph existed in 6 out of 19 cases examined by myself, and in 6 of 15 cases noted by Jenner, but only in 2 of 46 cases recorded by



Louis. In 19 out of 46 cases, Louis found a greater or less amount of reddish serous effusion in the pleuræ; in most of these cases there was hypostatic consolidation of the lungs (see p. 556).

6. The *Bronchial Glands* are occasionally enlarged when the lungs are inflamed, as is often the case in ordinary pneumonia.

f. Nervous System.

1. The *Cerebral Membranes* are less frequently congested than in typhus. Jenner found the dura mater normal in every one of 15 cases; the pia mater was congested in 5 cases, but in 4 of the 5 cases the congestion was confined to the larger vessels. Louis found increased vascularity in almost one-half of 46 cases, but in only 11 was the congestion considerable. There is no relation between the severity of the cerebral symptoms during life and the vascularity of the cerebral membranes found after death. The same remarks are applicable here as in typhus (p. 260).

I have never met with hæmorrhage into the cavity of the arachnoid in enteric fever. Louis makes no mention of it, and it did not exist in any of 19 cases examined by Jenner. Chomel, however, observed it in one case,^w and Griesinger and Buhl in 8 of 418 autopsies^x (see p. 261).

It is not often that the membranes can be torn from the brain with increased facility. Jenner noted this condition in only 1 of 9 cases (see p. 261).

2. *Intra-Cranial Fluid.* Effusion of serous fluid at the base of the brain, into the lateral ventricles, and beneath the arachnoid, is almost as common as in typhus, although the quantity is on the whole less. Louis and Jenner met with more or less sub-arachnoid serosity in 37 out of 61 cases, but in only 5 of the cases was it considerable in amount. The fluid thrown out into the several localities mentioned is *colourless and transparent*, and is no more a sign of inflammation, than it is in typhus (p. 262). It is only in very rare cases that signs of true meningitis are found, and they are usually associated with other signs of pyæmia, with disease of the temporal bone, or with tubercular deposit. Two cases of meningitis are recorded by Louis (*Obs.* 17 and 25): in one, the fluid in the arachnoid was turbid and contained a few albuminous flakes, but the

^w CHOMEL, 1834, Case 18.

^x GRIESINGER, 1864, p. 224.

vascularity of the membranes was not increased; in the other, a recent false membrane was found on the visceral surface of the dura mater, but here there was pyæmia and the symptoms of meningitis did not supervene until after convalescence had commenced. Other cases of meningitis have been observed by Griesinger, Buhl, and Hoffmann (see also p. 559).

4. *The Cerebrum and Cerebellum* are usually normal. Increased vascularity of the cortical substance (in 17 of 46 cases, Louis) or of the medullary portion (in 9 of 61 cases, Louis and Jenner) is occasionally met with. There was no trace of softening or induration of the cerebral substance in any of 15 cases examined by Jenner. Louis found induration of the brain in 7, and softening in 7, out of 46 cases; but these appearances were mostly uniform over the entire brain, and no relation could be traced between them and the severity of the cerebral symptoms during life. The remarks (p. 263) made under the head of typhus are also applicable here.

It was clearly shown by Louis and Chomel that the morbid appearances found in the brain and its membranes in enteric fever were equally common after death from other acute diseases, especially pneumonia, and that no relation existed between them and the intensity of the cerebral symptoms. My own observations agree entirely with their statements (see pp. 263 and 531).

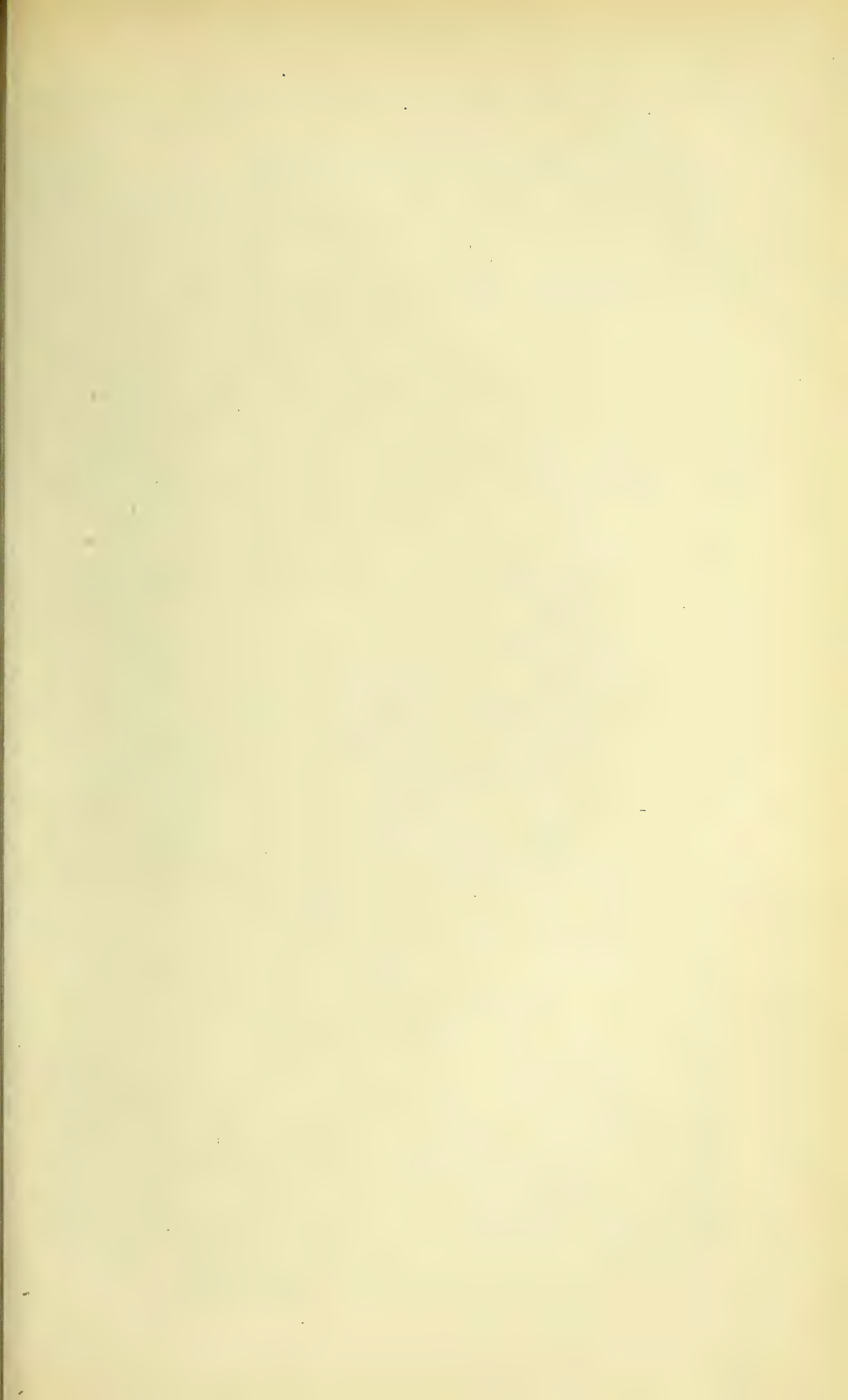
5. *The Spinal Cord* was examined by Louis in 6 cases, but presented nothing abnormal.

6. *The Sympathetic Ganglia*, according to Virchow, often contain an unusual amount of pigment in the interior of the ganglion-cells.⁷ (See p. 264)

g. *Urinary Organs.*

1. *The Kidneys* are often congested; in several instances I have found the hyperæmia so intense, that the organs presented a dark chocolate colour. At other times the kidneys are pale and increased in size, and the uriniferous tubes are crammed with granular epithelium. These appearances are rarer than in typhus. Louis found the kidneys hyperæmic in 17, and unusually pale in 5, out of 42 cases; the former appearance was most common in cases fatal between the eighth and the fifteenth day; in all the cases where the kidneys were pale, the duration of the illness had been consi-

⁷ *Cellular Path.* Eng. ed. p. 257.



derably longer. Hoffmann noted infarctions of the kidneys in 10 out of 250 cases. I have noted them in only two cases.²

2. *The Bladder.* The mucous membrane of the bladder is normal or slightly congested. In one instance Louis found a minute ulcer near the opening of the urethra. Diphtheritic inflammation and ecchymoses of the bladder are occasionally met with.

Nature of the Disease of the Intestinal and Mesenteric Glands, &c.

While many French, and some English, writers have erroneously regarded the intestinal affection as an exanthem, and compared it to the eruption of variola, the pathologists of the Vienna School taught for many years that the morbid deposit (*Typhus-masse*) occurring in the intestinal glands and elsewhere was an albuminous exudation, which, like tubercle or cancer, depended on a morbid condition of the blood, and underwent a peculiar development. A specific 'typhous cell' was described and figured by Gruby, Vogel, J. H. Bennett, and

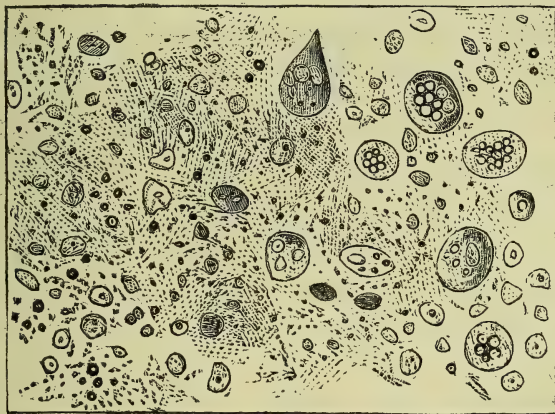


Fig. 22.—Corpuscles from one of the solitary glands in the ileum in a case of enteric fever, magnified 400 diameters.

others. It was maintained, that the deposition of this 'typhous matter' was not restricted to the intestinal and mesenteric glands, but that it was met with in the spleen, gall-bladder, stomach, œsophagus, larynx, lungs, etc. But, as already stated, there is no evidence that the lesions found in these organs are due to the deposit of a material resembling that found in the intestinal glands. Moreover, the morbid

² One of which is recorded in *Path. Trans.* xv. 145.

material found in the intestinal and mesenteric glands has no specific structure. Microscopic examination shows clearly that the enlargement of both the intestinal and mesenteric glands is due to a proliferation of the lymph-corpuscles, which constitute the natural cellular element of the gland-tissue. Most of the lymph-corpuscles are larger than in the normal state, and full of granular matter, while many may be seen as large as $\frac{1}{1200}$ inch in diameter, and containing one, two, three, or many rounded nuclei (see fig. 22.) These are the appearances seen in the early stages of the disease; when the glands become softened, the cells undergo disintegration, and mixed up with them is a large quantity of granular and oily matter.

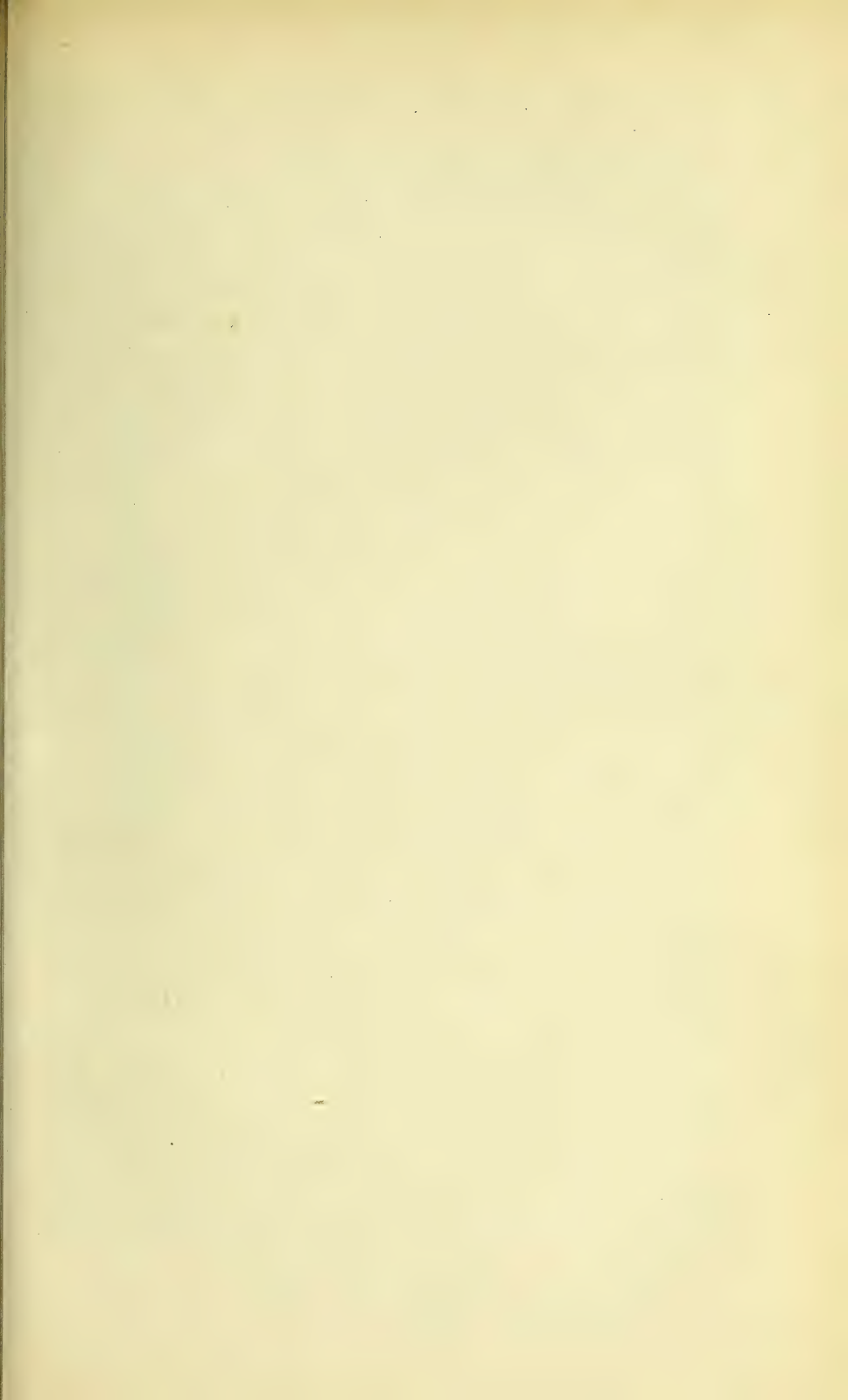
The lesions described as occurring in the spleen are partly due to changes in the quantity of contained blood, and partly to changes in the glandular elements similar to what occur in the intestinal and mesenteric glands. The Malpighian bodies are enlarged, and the splenic pulp, in addition to the ordinary lymph-cells, contains many other cells of larger size, and including several nuclei. These are found in largest number during the first fortnight or three weeks of the disease, while the organ is still firm; when the spleen becomes soft, the small lymph-corpuscles are more numerous, and are mixed up with much granular matter, and at the same time yellowish-brown pigment granules are often found in the cells and in the trabecular tissue.

It is to be remarked that the seats of the essential disease in enteric fever all belong to the lymphatic system. It is needless, at the present day, to insist on this connection as regards the spleen. Kölliker was one of the first to point out the close resemblance in structure which Peyer's patches bear to lymphatic glands, and he further showed that their period of greatest activity corresponded to that of intestinal absorption.^a Brücke succeeded in injecting the Peyerian glands from the lacteals;^b while Virchow has long insisted that the solitary and agminated glands have nothing in common with the glands which pour their secretion into the intestinal canal, and that a Peyer's patch is merely a lymphatic gland spread out in the coats of the intestine.^c Among anatomists and physiologists, this view as to the nature of the agminated and solitary glands

^a *Man. of Hum. Histology*, Syd. Soc. Transl. ii. 106.

^b *CARPENTER'S Princip. of Hum. Phys.* 5th ed. 119.

^c *Cellular Path. Eng.* Transl. p. 192.



of the bowel is now generally accepted, but it is remarkable how commonly it has been ignored by practical physicians in discussing the intestinal lesions of enteric fever. These glands are commonly believed to eliminate from the system the poison of the fever and in this way to become diseased, somewhat in the same way as it is argued that the kidneys are liable to become diseased while eliminating the poison of scarlet fever. The discharge of the poison by these glands into the bowel is also thought to account for the highly poisonous properties which the stools of enteric fever are said, by some writers, to possess. These views, however, are opposed to the normal functions of the glands in question, for it is difficult to imagine how glands can eliminate a poison from the blood into the bowel, whose proper function is to absorb from the bowel into the blood. It is true that the substance of the glands may by ulceration or sloughing be cast into the bowel; but, while their destruction is little calculated to promote the eliminatory functions which they are thought to possess, it is incompatible with the maintenance of any poisonous property of a specific character like that of small pox, and it is remarkable that the cases which do not go on to ulceration or sloughing, but where the whole of the supposed poison is absorbed into the blood, are always the shortest and the mildest.

But, if the enlargement of the intestinal glands be not due to eliminatory efforts, how are we to account for it? Minute examination of the enlarged glands shows that they are in a state of inflammation, and this inflammation appears to be due to the irritation of some poison absorbed from the bowel—not vitiated bile or intestinal secretions, which some writers imagine to be the cause of the lesions in the lower part of the ileum—but the actual poison of the fever, which is frequently if not always,^a swallowed with the ingesta, and for which the agminated and solitary glands may be said to have an elective affinity. The inflammation of these glands is similar to what takes place in other lymphatic glands from absorption of the poisons of syphilis, pyæmia, and tubercle. The more actively the normal functions of the glands are performed, the more probably will they absorb the poison, and thus it is that enteric fever is most common in persons under 30 years of age. The intestinal and mesenteric glands, as we have found, become enlarged from the commencement of the disease, and it is through them

^a Not always, if the foetus in utero may be attacked. (See p. 441.)

that the system becomes infected, while, at the same time, the inflammation may spread from the former to the mucous membrane, and so excite intestinal catarrh and diarrhoea. The fever which is lighted up by the absorption of the poison into the system has a tendency to subside about the middle or end of the second week, when the inflammation of the intestinal and mesenteric glands and of the spleen undergoes resolution; but when the inflammation proceeds to gangrene, ulceration, or softening, the fever is maintained, or increased (p. 547.)

The morbid anatomy of enteric fever may be summed up as follows:—

1. The agminated or solitary glands of the ileum, the mesenteric glands, and probably the spleen, are invariably diseased.

2. Many other secondary lesions are found, which are not constant or essential. The chief of these are peritonitis, granular or other degenerations of the liver, kidneys, heart and voluntary muscles, ulcerations of various mucous surfaces, pneumonia, bronchitis and hypostatic congestion of the lungs, and an increase of intra-cranial fluid. There are no signs of inflammation in the brain, or its membranes, to account for the cerebral symptoms.

3. There is no specific 'typhous exudation,' and no evidence that the secondary lesions are due to the deposit of a material like that found in the intestinal and mesenteric glands.

4. The enlargement of the intestinal and mesenteric glands is not due to any effort at elimination, but to inflammation which is probably excited by absorption of a poison in the bowel.

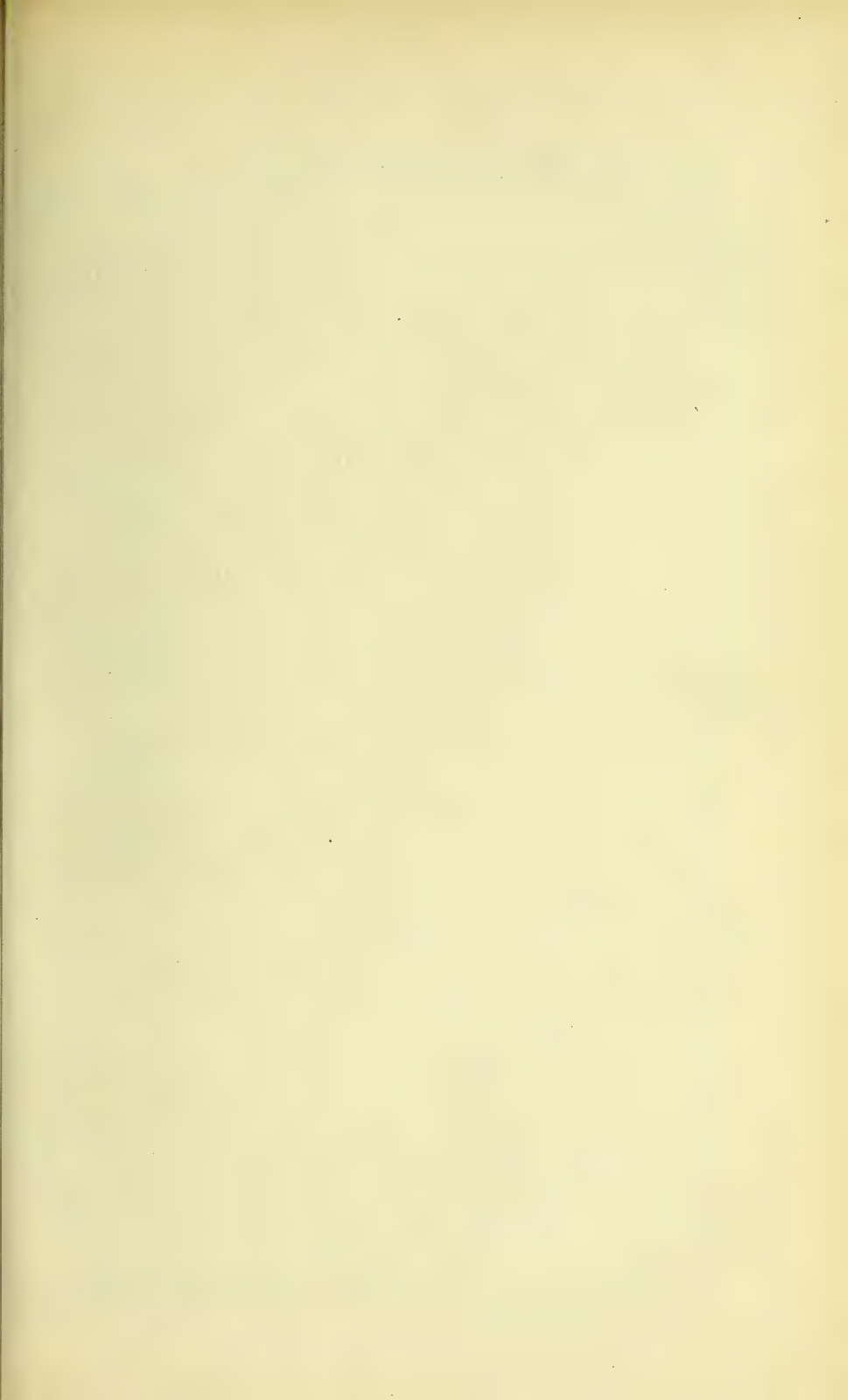
SECTION XIII.—TREATMENT.

A. Prophylactic Treatment.

As in typhus, the prophylaxis of enteric fever involves the measures calculated to prevent the origin, as well as the propagation, of the poison.

1. Measures for preventing the Generation of the poison of Enteric Fever.

Instead of cutting off thousands annually, enteric fever would be a rare disease, if we could prevent the products of



faecal fermentation entering our houses, and polluting our drinking water. The chief rules to be attended to are these:—

1. The cisterns and water-butts in every dwelling ought to be scrupulously cleansed from time to time, and care must be taken that the waste-pipe of the cistern does not pass down directly into a drain, and thus become the means of ventilating the drain into the cistern. When drinking water is derived from surface-wells or running streams, there must be no cess-pool, drain, or other nuisance in the vicinity, from which organic impurities may percolate through the soil into the water. Water-companies ought to be criminally responsible for supplying drinking water polluted with organic matter at its source or in its transit. From whatever source derived, it is a good precaution always to filter drinking water, and persons travelling much will do well to provide themselves with a portable filter. Drinking water ought to be tested from time to time to discover if there be any organic taint. All that is necessary is to add to a tumblerful one or two drops of Condyl's (crimson) Fluid, which will give it a very faint pink hue. If, after standing for half-an-hour, the pink colour has gone or turned to yellowish, the water is tainted and cannot be drunk with safety; but if the pink hue maintains itself, it is free from organic impurity. When no filter is within reach, it is a good plan to add to any suspicious drinking water a drop or two of Condyl's Fluid.

2. Care must be taken to keep all house-drains in good order, free from leakage and obstruction, and with all water-closets, sinks, and other openings into them properly trapped. It must be remembered also that the trapping may be perfect, and yet effluvia may escape from drains if the supply of water be deficient, or if the drain beyond the trap be not properly ventilated. The waste-pipes of baths, basins, and sinks ought, therefore, to be disconnected from the main drain, as well as trapped; while the drain-pipes of all closets before entering the main drain should be ventilated and deodorized.* When bad smells escape from sinks or drains, chemical disinfectants ought to be used, and thorough house-ventilation carried out, until the cause of the escape is investigated and removed; but it must not be forgotten that the poison of enteric fever, although often accompanied by bad smells, may

* Different methods for effecting this are described in a useful little work entitled *Healthy Houses*, by W. Eassie, C.E. London, 1872.

be itself inodorous. It is a good precaution to flush all house-drains, and scrub and cleanse all sinks, once or twice a week with abundance of water containing some disinfectant. No cess-pool ought to be tolerated within the walls of any dwelling house.

3. When the drains or cess-pools of a house are opened for the purpose of repair or cleansing, chemical disinfectants ought to be applied freely to their contents, and thorough ventilation enforced, and the residents will do well to absent themselves while these operations are going on. From neglect of this rule, enteric fever has often broken out in consequence of the measures resorted to for its prevention.

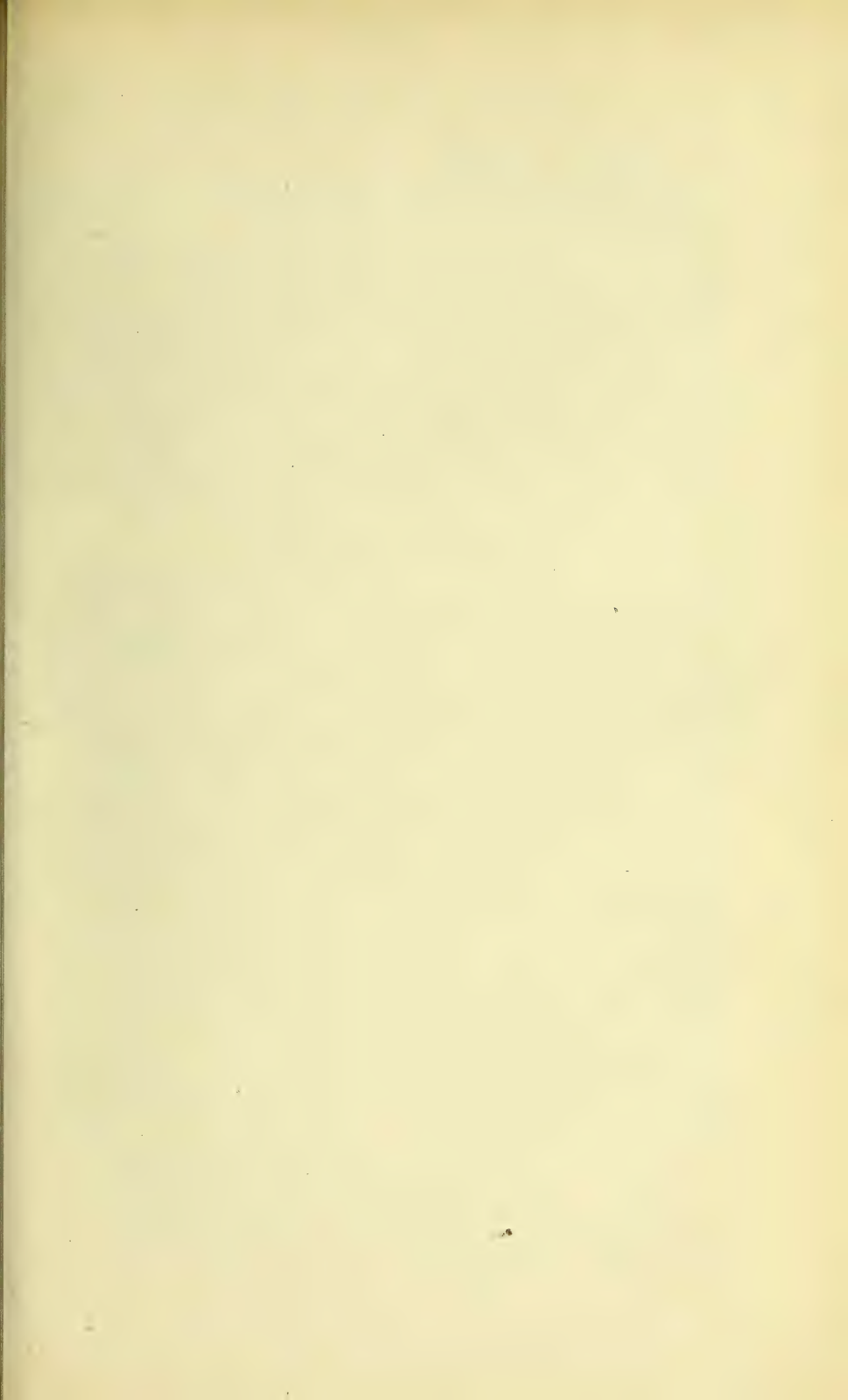
4. The best chemical agents for preventing faecal fermentation are carbolic acid, copperas or sulphate of iron, Burnett's Fluid (which is a solution of chloride of zinc), and the chloride of lime. The liquid carbolic acid may be diluted with water in the proportion of 1 to 40, or it may be mixed with sand or sawdust. Copperas is to be used in the proportion of 2 ounces to a pint of water. Condry's Fluid is also a good disinfectant. It acts by liberating a large amount of oxygen, which combines with and destroys the products of decomposition, but it is not an antiseptic; and the same remark applies to Chloralum and charcoal, which absorb the volatile products of decomposition.

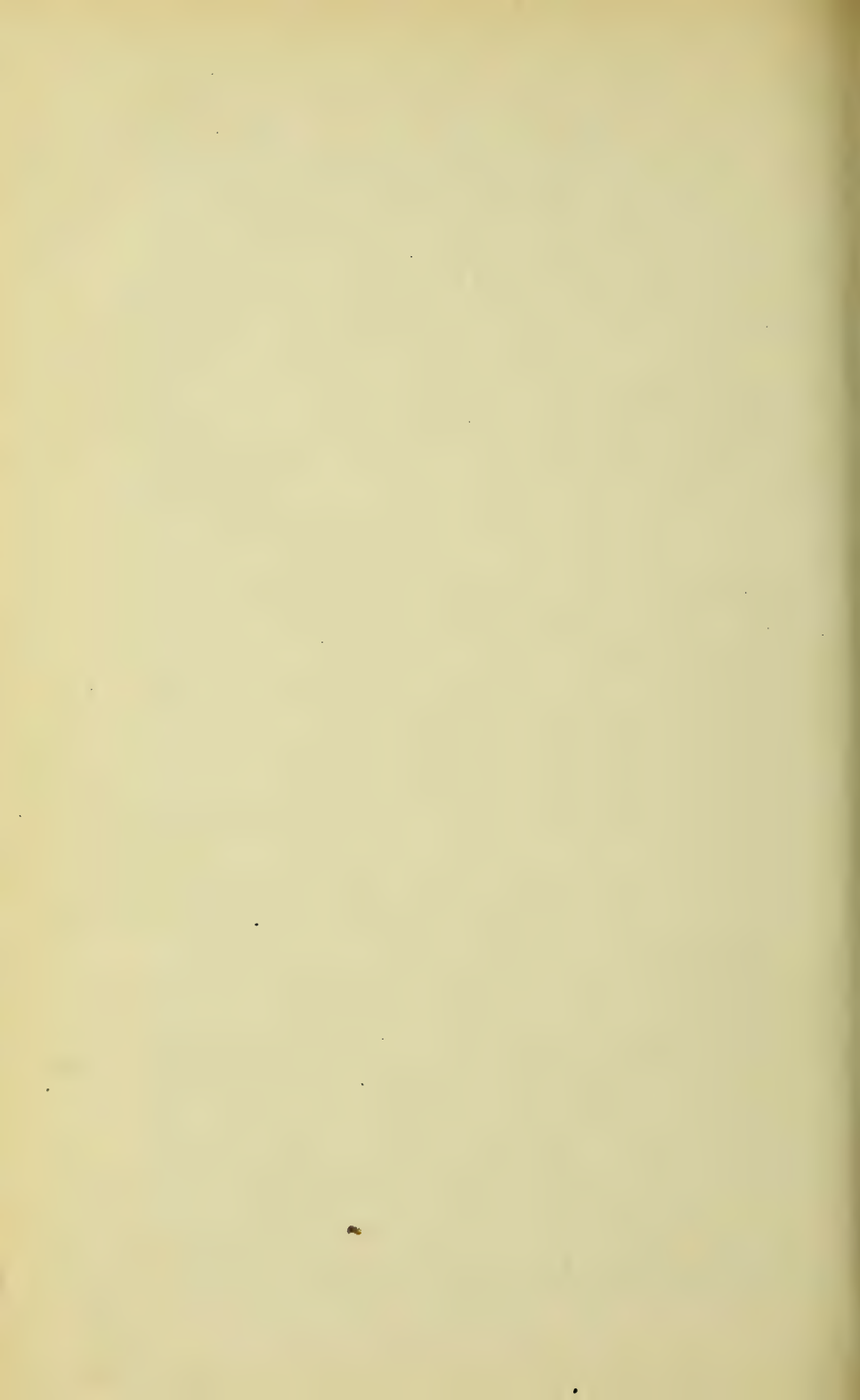
5. The preventive measures now referred to, and others which will suggest themselves according to circumstances, are especially called for in the autumn and in hot seasons, and in the case of exposure to the nuisances specified of persons below the age of thirty.

2. Measures for preventing the Propagation of the Poison of Enteric Fever.

1. When enteric fever is propagated by the sick to persons in health, the alvine evacuations are the chief, if not the only, medium of communication. These excreta ought, therefore, to be disinfected by one of the chemical substances already mentioned, of which the best is carbolic acid (1 to 40 of water) from its power of arresting fermentation, as soon as they escape from the body, and before they are emptied into water-closets or privies, and they ought never to be thrown on places whence they can find their way into the sources of drinking water.

2. All bedding and body-linen soiled with the excreta of the sick ought to be soaked in a tub of water containing carbolic acid





(4 fluid ounces to a gallon), or be boiled, or baked in a disinfecting oven or before the fire, or in the sun, before being washed.

3. The sick-room ought to be thoroughly ventilated, and vessels placed in it containing Condry's Fluid or Chloralum, for the purpose of decomposing or absorbing any noxious exhalations.

4. But in addition to these precautions, attention must be directed to the original cause of the first case of fever in the house, the persistence of which is probably a more fertile source of fresh cases than any poison derived from the person first infected. Such nuisances as have been mentioned under the head of Etiology are to be sought for and remedied; and while this is being done, it will be often advisable that all the inmates below thirty years of age should absent themselves from the infected house.

B. Curative Treatment.

There is no specific for enteric fever any more than for typhus. Baglivi's 'remark on 'mesenteric fever,' made two centuries ago, holds good at the present day:—'*Sed quod præ cæteris animadverto, in nullo morborum genere, tantâ opus est patientiâ, expectatione, cunctationeque, ad bene et feliciter medendum, tamquam ad bene curandum febres mesentericas.*'* But though much mischief may be done by the *nimia diligentia medici*, by depletion on the one hand or by over-stimulation on the other, it must not be thought that the best treatment is one of mere expectancy. Although we cannot cure the disease, we must treat it; and with increasing experience scepticism gives way to the belief that many lives are saved by medical interference at the proper time and in the proper way. If we can keep the patient alive a certain time, the disorder will pass away; and hence it is always important to determine the precise duration of the attack, and to study the tendencies to death, by obviating which the patient may be enabled to tide over the critical period. The objects to be aimed at are very similar to those referred to in discussing the treatment of typhus. (See p. 272.)

I. Neutralize the poison and improve the state of the blood.

1. The Mineral Acids are as useful in the treatment of enteric fever as in typhus, and the remarks already made on the

* BAGLIVI, 1696, ed. 1704, p. 51.

subject may be referred to (p. 273). It may be well, however, to repeat that we are ignorant of the precise manner in which they act, and that they are not specifics for enteric fever, as might be inferred from assertions repeatedly made of late years in the medical journals. I have not observed that they increased the severity of the abdominal symptoms; and for diarrhoea, the dilute, or the aromatic, sulphuric acid is one of the best astringents.

2. *Antiseptics.* Creasote, carbolic acid, sulphurous acid and its salts, iodine, and chlorine, have all in turn been recommended in the treatment of enteric fever; and they have this to recommend them, that they might be expected to act directly upon the poison in the intestinal canal. I have tried them all in a considerable number of cases, but without any marked result, except that of moderating tympanitis and diarrhoea.

Carbolic acid I have given in frequent doses of 2 minims, with chloric ether and syrup in mint water. Of 9 cases treated in this way, 2 died, and 2 had a relapse. M. Pécholier of Montpellier tried creasote, both by the mouth and in enemata, in 60 cases, and came to the conclusion that, when the treatment was commenced early, it diminished the intensity and shortened the duration of the fever.^f

The sulphites, strongly commended by Polli of Milan for the treatment of zymotic diseases in general, have been stated by many observers to be of service in enteric fever.^g A scruple of the sulphite of soda, or from 1 to 2 drachms of sulphurous acid, largely diluted, may be given every four hours. I cannot say that I have found them to shorten the duration or intensity of the fever, while, in some instances, they have seemed to me to excite diarrhoea.

In 1859 M. Magonty of Paris published a work announcing a specific method for the treatment of enteric fever, which consisted in the administration of iodine and iodide of potassium, both by the mouth and in enemata, with the object of destroying the putridity of the intestinal contents.^h The iodine treatment has lately been revived by Willebrandⁱ and Liebermeister.^j Willebrand dissolves 6 grains of iodine and 12 of iodide of potassium in 1 drachm of water, and gives 3 or 4

^f *Gaz. Hebdom.* 1869, p. 200; and *Med. Times and Gaz.* 1869, i. 362.

^g J. F. NICHOLLS, *Trans. St. And. Med. Grad. Assoc.* vol. i.; R. S. CROSS, *Lancet*, 1868, i. 81; P. W. JONES, *Lancet*, 1869, i. 45, 126.

^h MAGONTY, 1859.

ⁱ WILLEBRAND, 1865.

^j NIEMEYER, *Text Book Pract. Med.*, Amer. Transl. ii. 596.

H. G. Johnson's thanks and civility
Bonds and increase business. Peach.
Jan. 1875.

drops of this solution in a wine-glass of water every two hours, ~~and~~ believes that by this treatment the duration of the fever may be shortened. Several years ago I tried Magonty's plan in several cases without any apparent advantage, and one of the patients died of intestinal hæmorrhage.

Of all the remedies belonging to this class, free chlorine has appeared to me to be most useful. Highly commended many years ago by Professor Schönlein of Berlin,^{*} it has since then been used with advantage by many physicians,¹ and I have repeatedly found it to have a beneficial influence upon the abdominal symptoms. Twenty minims of the liquor chlori may be added to each dose of the hydrochloric acid mixture (p. 273), or a mixture may be ordered as follows:—

Take of chlorate of potash gr.vi, and strong hydrochloric acid ℥xxxvi; introduce both into a bottle and cork tightly. After five minutes add water gradually to ℥xi, agitate well after each addition of water, and then add Acid. Hydrochlor. dil. ℥iv, Spirit of Chloroform ℥iv. Dose one or two tablespoonfuls in water.

II. *Promote elimination not merely of the Fever-poison, but of the products of metamorphosis.*

1. *Fresh Air.* (See p. 274.)
2. *Diluents.* (See p. 275.)
3. *Diuretics.* (See p. 275.) The nitrate, bitartrate, and acetate of potash ought to be avoided owing to the condition of the bowels, but the flow of urine may be maintained by digitalis, nitrous ether, gin, &c.
4. *Salines.* (See p. 276.)
5. *Diaphoretics* (see p. 277) are sometimes useful for moderating the pyrexia in the early stage of the attack, but it must be remembered that periodical perspirations often occur naturally without affording much relief (p. 518).
6. *Emetics* (see p. 277) have been recommended in the treatment of enteric fever from time immemorial, and are still favourite remedies with many practitioners. Dr. James Jackson, of America, by a comparison of a large number of cases treated with and without emetics, has endeavoured to show that they reduce the duration as well as the severity and rate of mortality of the disease. His remarks are well worthy of

^{*} *Ed. Med. Journ.* Sept. 1862, p. 227.

¹ NIEMEYER, *Op. cit.* ii. 598; YEO, *Med. Times and Gaz.* 1868, i. 117.

perusal.^m I have repeatedly observed that an emetic given during the first week in apparently severe cases was followed by an abortive attack, although of course such cases are open to the objection that cases which set in severely may abort independently of an emetic (pp. 587, 606). Emetics administered within the first ten days often relieve the headache and gastric disturbance: Indeed, they constitute one of the best remedies for vomiting in the early stage. They ought never to be given after the twelfth day, for when the peritoneum is laid bare by the intestinal ulcers, the act of vomiting may induce perforation.

7. *Laxatives.* The ordinary practice in this country has been to avoid laxatives in the treatment of enteric fever, and the advice given by the late Dr. Todd in the following words has been generally accepted:—‘Restraining diarrhoea and hæmorrhage in typhoid fever, and when you have fairly locked up the bowels, keep them so. Patients will go for four or six days, or even longer, without suffering inconvenience from this state of constipation.’ⁿ On the other hand, many physicians, including Andral, Bretonneau, Louis, and Trousseau, have recommended the frequent administration of laxatives. The treatment which was long famous at Paris as the method of M. de Larroque consisted in the administration of an antimonial emetic, followed by frequent doses of calomel, castor-oil, or Seidlitz-water, laxative enemata, and cataplasms to the abdomen. Diarrhoea, meteorism, and abdominal pain were not regarded as contra-indications, but when the purging was excessive the treatment was suspended for twenty-four hours. The practice was founded on the belief that the typhoid symptoms of enteric fever were due to the retention of decomposing matters in the intestines.^o Andral reported favourably on this treatment, and Louis, in the second edition of his work, gave an analysis of 38 cases in which he had tried it, and arrived at the conclusion that it was superior to all other methods in every form of the malady. More recently, laxatives in enteric fever have been recommended in this country by W. T. Gairdner,^p G. Johnson,^q and T. J. MacLagan,^r and calomel has long been a favourite remedy with many practitioners in Germany. My experience in many thousand cases has led me to the conclusion that the

^m *Letters to a Young Physician*, Boston, 1855, p. 326.

ⁿ TODD, 1860, p. 180.

^o LARROQUE, 1835.

^p GAIRDNER, 1862 (2), p. 202.

^q *Brit. Med. Journ.* 1867, i. 279.

^r MACLAGAN, 1871.

Dr. C. Macleod suggests *Spica* in early stages
of Typhoid Fever not as an emetic, "but for
its power as a blood depressant."

B.M.J. 1875. II: 225.

Dr. G. thinks that passage referred to does not
warrant his being grouped with Dr. Johnson & Dr. Macleod
as recommending *Lascatives*. April. 1875

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On this see Kennedy in "Practitioner" for June, 1875.
He opposes Dr. Johnson.

cerebral symptoms of enteric fever are not due to the absorption of putrid substances from the intestine, and that diarrhœa is not a process of elimination to be encouraged. The most urgent diarrhœa often coexists with great tympanitis and the most severe cerebral symptoms, and is very apt to be followed by hæmorrhage or perforation; the danger in fact is in direct proportion to the severity and duration of the diarrhœa,* and in cases which have been doing well I have repeatedly known the most alarming symptoms, induced by a severe attack of diarrhœa, coming on spontaneously or after a strong purgative. Dr. Parkes's observations also go to show that the quantity of urea excreted by the kidneys in enteric fever is not affected by the diarrhœa. On the other hand, in most of the mildest cases of enteric fever there is never at any time diarrhœa, the absence of which is in itself a favourable indication. It does not follow, however, that no interference is justifiable when the bowels are constipated. When there is constipation at the commencement of the attack, it is well to commence the treatment by a small dose of castor-oil, or of rhubarb in peppermint water. In this way we may possibly succeed in expelling some portion of the poison which has been swallowed, but has not yet been absorbed. According to Wunderlich, Pfeuffer, and Niemeyer,† one or two 5 grain doses of calomel given in the first week, before there is much diarrhœa, often render the disease milder and shorter, and in a few instances seem to cut it short. When the bowels are confined at a later stage, I am in the habit of prescribing every second or third day one or two teaspoonfuls of castor-oil, or a simple enema. But when constipation succeeds to severe diarrhœa, the best practice, I believe, to ~~be to~~ abstain from interfering for four or five days, and then only to prescribe a simple enema, or one tea-spoonful of castor-oil, if the patient has any abdominal discomfort. Under all circumstances, jalap, col^ynth, ~~calomel~~, and all drastic purgatives are, as Baglivi long ago remarked, 'to be shunned like the plague' (p. 422).

III. *Reduce the temperature and the frequency of the action of the heart.*

1. *Blood-letting* was long resorted to for these objects, but there are the same objections to it as in typhus. It is worth

* Even the cases recorded by Louis show that the disease was most severe when there was the greatest purging.

† *Text Book of Pract. Med.*, Amer. Trans. 1869, ii. 595.

was

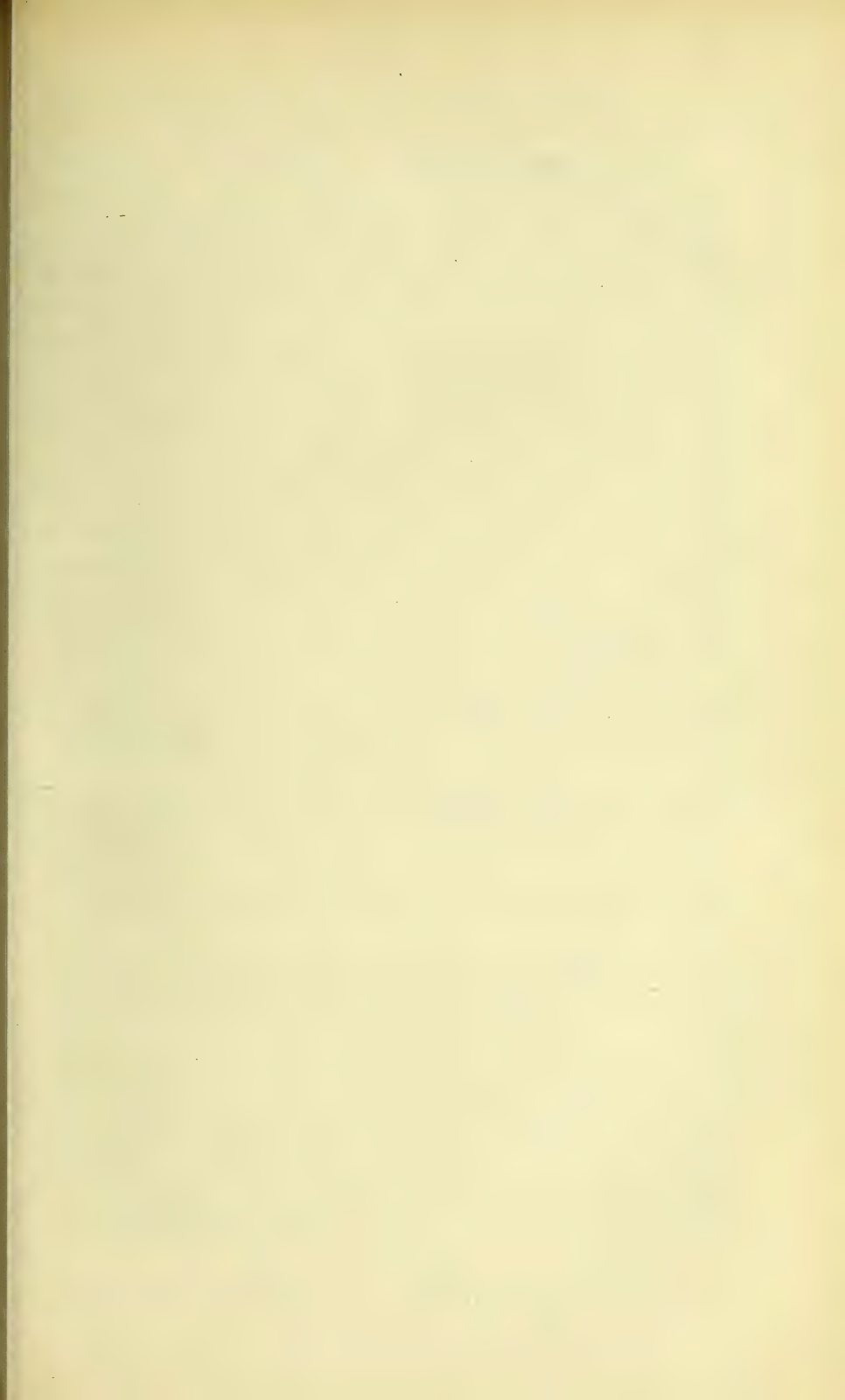
remembering also, that although the temperature falls on copious hæmorrhage taking place from the bowels, it very soon rises again.

The history of continued fevers shows that blood-letting has been far more practised in enteric fever than in typhus. Early in the present century the practice received a fresh stimulus from the promulgation of the doctrines of Broussais, who, believing the fever to be only a symptom of local inflammation, recommended blood-letting at every stage of the disease. Louis, Chomel, and many other writers, although disputing the doctrines of Broussais, practised blood-letting in the early stage; while Bouillaud's treatment consisted in frequent copious abstractions of blood from a large vein, with leeches and cupping in the intervals. For example, one of Bouillaud's patients, suffering from enteric fever complicated with pneumonia, was bled largely six times from the arm, was cupped three times, and had 60 leeches applied to the chest and abdomen. Under this treatment ('émissions sanguines coup sur coup'), it was alleged that the mortality was much smaller than in the practice of Louis and Chomel, who bled more sparingly." Although in the discussion which followed the enunciation of this practice it was shown that Bouillaud's success was founded on fallacious statistics, his treatment is still pursued in many parts of the Continent, where from time to time we hear of valuable lives being sacrificed to it. Bouillaud's practice never obtained favour in this country; but when the disease sets in with urgent abdominal symptoms, the application of a few leeches to the abdomen or around the anus will sometimes relieve the pain and moderate the diarrhoea.

2. *The Cold Water Treatment.* (See p. 179.) Currie practised the cold affusion in all forms of continued fever; but he looked upon severe diarrhoea as a contra-indication. In 1846 Dr. Stallard treated a number of cases of enteric fever with the 'cold pack.' The patient was enveloped in a cold wet sheet and covered with a blanket. After ten or fifteen minutes he was transferred to a blanket heated before the fire, and covered with bed-clothes. He soon began to perspire, and sank into an undisturbed sleep, from which he awoke free from headache and pain, and greatly refreshed. One effect of the treatment was to confine the bowels." In Germany the common treat-

" BOUILLAUD, 1836, p. 380.

† *Brit. and For. Med. Chir. Rev.* Jan. 1847, p. 269.



ment of enteric fever is now the external application of cold according to one or other of the methods already described, and the reader is referred to the remarks upon this subject at page 280.

When the cold water treatment is not resorted to, the body ought to be sponged two or three times daily with tepid water containing one-fourth part of vinegar, or a little Condyl's Fluid. This is often a source of great comfort to the patient, and conduces to sleep.

3. *Quinine*, in 10, 15, or 20 grain doses, has the same power to reduce pyrexia in enteric fever as in typhus, and is useful under similar circumstances to those for which it has been recommended in that disease. (See p. 283.) The recent observations of Wachsmuth^w and Liebermeister^x seem to show that under its use the remissions in some cases become more decided, and the exacerbations less severe, but there is no satisfactory evidence that the duration of the attack is shortened by its use. In cases where the disease puts on a decidedly remittent type smaller doses of quinine may be given with advantage, and I have long been in the habit of adding one or two grains of quinine to each dose of the acid mixture.

℞. Acid. Hydrochlor. dil. ℥xv-xxx / Quin. Sulph. gr. j-ij, Infus. Digital. 3ss, Tinct. et Syrup. Aurant. āā 3ss., Aq. ad 3jss. M. Fiat haust. 4tā q.q. horā sum.

Barthez and Rilliet also report favourably on the effects of quinine in the enteric fever of children, which is so often remittent.^y

CASE LXXXVII. *Enteric Fever. Good effects of Quinine at Critical Stage.*

Miss J——, aged 20, began to sicken with enteric fever on Jan. 11th, 1872. She was attended by Dr. Bishop of Paris, whom I frequently met in consultation. She had rose spots and diarrhoea, and in the early part of her illness was very nervous and despondent, and slept badly. At the end of the second week she became much worse. The morning temperature rose to 105°; pulse 128; during the day she insisted that she was going to die, and at night she became very delirious; the diarrhoea persisted. On the 19th day the patient appeared to be in extreme danger; pulse 132; respirations 48; temp. 105°; tongue dry; bowels loose; moist râles over both lungs; constant delirium; a trace of albumen in urine. At 3 a.m. on the morning of

^w *Archiv der Heilkunde*, 1863, iv. 69. ^x *Deutsch. Archiv f. klin. Med.* 1867, iii. 23.

^y BARTHEZ and RILLIET, 1853, ii. 724.

the 20th day, the condition being unchanged, quinine was commenced, at first in 5, then in 10, and then in 15 grains every three hours. In 13½ hours as much as 55 grains were given. At 5.30 p.m. the patient had an attack of syncope, and for some minutes was pulseless, but rallied soon after brandy. Quinine suspended. At 7 p.m. pulse 112; respirations 40; temp. 102°; and at 10.30 p.m. pulse 108; respirations 38; temp. 101.6°. At 2.30 a.m. of 21st day the temperature still did not exceed 102°, but at 4 a.m. it had risen to 103.5°, and the patient was in a state of profound stupor, from which she could not be roused; pulse 120, and very feeble; respirations 48; involuntary evacuations. She was thought to be dying. Ten grains of quinine were given and a blister applied to forehead. At 8 a.m. she showed some sign of consciousness; and at noon pulse 108; respirations 40; temp. 100.5; at 3.30 p.m. temp. 100°; and at 10 p.m. pulse 108; respirations 38; temp. 99°; mind much clearer, no albumen in urine, and tongue cleaning. After this there were several exacerbations of fever, but none of great severity, and by the 28th day, with the exception of some weakness of the mind and delusions, she was quite convalescent.

4. *Cardiac Sedatives.* (See p. 284.)
5. *Hygienic Measures.* (See p. 285.)

IV. *Sustain the vital powers by appropriate food and stimulants, but in doing so avoid exciting congestion, or increasing the work of the already overtaken glandular organs.*

1. *Diet.* As long as the fever lasts the diet must be similar to what has been recommended in the case of typhus (see p. 285), the existence of the intestinal lesions being an additional reason for caution. Beef-tea appears sometimes to increase the diarrhoea, and may then be advantageously thickened by the addition of a little gelatine or arrowroot.

2. *Alcoholic stimulants.* The remarks already made on the use of stimulants in typhus (p. 286) apply also to enteric fever, except that in the latter disease stimulants are oftener called for in patients under twenty years of age, but a smaller quantity usually suffices in patients more advanced in life.

3. *Medicinal stimulants.* (See p. 290.) Large doses of carbonate of ammonia are even more objectionable than in typhus, from their tendency to irritate the bowels and increase the diarrhoea.

4. *Conserve muscular power.* (See p. / .)

Solid Food recommended in Typhoid.
See "Paediatrics" March 1878 and previous
numbers.

See Dr. Geo. Johnson - Practitioner
Jan. 7 - advocates letting diarrhoea alone.

V. *Relieve distressing Symptoms.*

Many of the symptoms of enteric fever, such as *headache* (p. 290), *sleeplessness* and *delirium* (p. 292), *drowsiness* and *stupor* (p. 298), *convulsions* (p. 300), *hiccup* (p. 301), *albuminuria* (p. 298), &c., require the same treatment as in typhus, except that strong purgatives must always be avoided. Certain symptoms, however, peculiar to enteric fever also call for treatment. The chief of these is:

1. *Diarrhœa*. It is usually well to have recourse to astringents when there are more than two motions in the twenty-four hours; and if the patient be very prostrate, even this amount of action may be injurious.

The milder forms of diarrhœa are usually checked by a starch enema, containing from ten to twenty drops of laudanum, or by temporarily adding two or three minims of laudanum or of Battley's liquor opii sedativus to each dose of the ordinary acid mixture (p. 273); or sulphuric acid, which is more astringent than the other mineral acids, may be prescribed as follows:—

R. — Acid. Sulph. Aromat. ℥xx, Liq. Op. Sed. ℥iij, ~~Decoct. Hæma-~~
~~tor. vel~~ Aq. Menth. pip. ʒj. M. Fiat haust. 3â vel 6â q.q. horâ sum.

wf wf

When these remedies fail, or when the acids are not tolerated by the stomach, recourse may be had to the subnitrate of bismuth in a mucilaginous mixture, lime-water, vegetable charcoal (a teaspoonful every four hours), which is particularly useful when there is much tympanitis along with diarrhœa, powders composed of equal parts of Dover's powder and hydrargyrum cum creta, or the acetate of lead. The last has long been a favourite remedy at the London Fever Hospital; it may be given in solution in doses of two or three grains every four or six hours, with or without the twelfth of a grain of acetate of morphia. The ordinary vegetable astringents are less efficacious than the remedies now mentioned.

Tinct. Catechu

When from any cause opiates even in small doses are contra-indicated (p. 2), the chief reliance must be placed upon the acetate of lead, bismuth, and charcoal; or drachm doses of the tincture of catechu may be given every three or four hours.

In addition to these remedies much benefit will be derived in every case of enteric fever where there is diarrhœa, abdominal pain, or tympanitis, from constant fomentation of the abdomen with poultices, or with wet flannel covered with oiled

silk or gutta percha. Stupes moistened with turpentine or with the compound camphor liniment may also be applied at intervals.

Other plans of treatment for the diarrhœa have been proposed, a knowledge of which may be useful.

Huss strongly recommends small doses of ipecacuanha in combination with phosphoric or sulphuric acid and fomentation of the abdomen, and assisted, if need be, by starch and opium enemata.²

Some years ago Professor Fouquier of Paris wrote very strongly in favour of alum dissolved in gum. He commenced with twenty-four grains in the day, and gradually increased the quantity up to a drachm.^a Alum may also be used in the form of 'alum-whey,' which is prepared by adding one drachm of alum to a pint of boiling milk, and then straining; two ounces may be given after each motion of the bowels.

Nitrate of silver has been recommended by many practitioners, both by the mouth and also in the form of enema.^b In the latter form it is difficult to understand how it can act beneficially, seeing that the ileum is the chief seat of disease. In severe diarrhœa, after the fourteenth day, the late Dr. Joseph Bell found advantage from nitrate of silver, in doses of from one to three grains made into a pill, and taken every six or eight hours.^c Sulphate of copper is a favourite remedy with some physicians; a quarter of a grain may be given in pill with a like quantity of opium, or in solution with sulphuric acid, quinine and a few drops of laudanum, every four or six hours. Both the sulphate of copper and the nitrate of silver have appeared to me to be most serviceable for the diarrhœa due to 'atonic ulcers,' after the primary fever has ceased.

The treatment of the late Professor Trousseau consisted in giving first laxative doses of sulphate of soda or Seidlitz powders, which were believed to check the diarrhœa by altering the secretions, and to be particularly useful when there was much meteorism as well as diarrhœa. If this did not succeed, he then ordered the English *mistura cretæ* or equal parts (7 grains of each) of prepared chalk and of the subnitrate of bismuth to be taken from three to eight times in the twenty-four hours. These remedies failing, he had

^a HUSS, 1855.

^b *Brit. and For. Med. Rev.* 1836, i. 568.

^c YATES, 1853; also BOUDIN, *Journ. des Con. Méd. Prat.* Mai 1839.

^d BELL, 1860, viii. 385.

recourse to pills containing about a tenth of a grain of nitrate of silver.^d

Lastly, Dr. G. Johnson advocates that the diarrhoea be let alone; but when there is much meteorism, that a tablespoonful of castor oil by the mouth, or a laxative enema, be administered.*

2. *Hæmorrhage from the Bowels*, during the first ten days of the disease, is usually slight, and is readily checked by the acetate of lead and morphia, and the starch and opium enmata already recommended for diarrhoea. When intestinal hæmorrhage co-exists with hæmorrhages elsewhere, large doses of the perchloride or pernitrate of iron will be found useful. But when profuse hæmorrhage from the bowel occurs by itself at an advanced stage of the disease, the patient is in great danger (see p. 527), and my experience is entirely opposed to the advice recently offered by Sir W. Gull, that 'it is best to trust to the hæmorrhage to cure itself.'^f The remedies mainly to be relied on are tannic acid, turpentine, rhatany, opium, and ergot. During many years I have found the following mixture almost invariably successful for arresting the bleeding. The doses are for an adult—℞. Acid. Tannic. gr. x, Tinct. Op. ℥x, Spirit. Terebinth. ℥xv, Mucilag. ʒij, Tinct. Chloroform. Co. ℥xx, Aq. Menth. pip. ad ʒj. M. Ft. haust. 2â q.q. horâ sum.

Latterly I have found ergot a most efficacious styptic, even in the most profuse hæmorrhage. Dr. J. B. Russell of Glasgow gives the tincture of ergot in drachm doses every hour, and has never known it fail.^g Ergot also possesses this advantage, that it may be administered subcutaneously. From 3 to 5 grains of ergotine dissolved in 10 minims of distilled water, or in equal parts of glycerine and rectified spirit, may be injected beneath the skin. With these internal remedies perfect rest is to be enjoined; a bladder containing broken pieces of ice is to be applied over the right side of the abdomen, and ice may be given to suck. Stimulants are to be administered according to the state of the pulse.

3. *Vomiting* occurring during the first ten days of the disease is often relieved by an emetic. If emetics fail, or if they be contra-indicated, as they always are after the tenth day (p. 646), a sinapism or a turpentine stupe is to be applied to the epigastrium, while ice is given to suck. If the vomiting

^d TROUSSEAU, 1861, p. 182.

* Brit. Med. Journ. 1867, i. 279.

^f Lancet, 29th June, 1872.

^g Glasgow Med. Journ. May 1869.

continue, which rarely happens, the acid treatment must be suspended and lime-water or bismuth and hydrocyanic acid are to be substituted. Equal parts of lime-water and milk I have often found an excellent remedy in such cases. The practitioner should bear in mind that vomiting coming on after the fourteenth day is often the first symptom of peritonitis.

4. *Tympanitis* is sometimes so excessive as to impede the breathing, and cause great distress to the patient, while the distended state of the bowel increases the risk of perforation. Much may be done to prevent tympanitis by turpentine-stupes and constant fomentation of the abdomen, but very often other measures must be resorted to. The gas is mainly in the colon, and, accordingly, enemata are the most effectual remedies. The best enemata are those containing carbolic acid (Glycerin. Acid. Carb. ʒss, Decoct. Hordei Ojss.), creasote (Creasot. mʒj, Glycer. ʒss, Decoct. Hord. Ojss.), vegetable charcoal (Carb. lig. ʒj, Mucilag. ʒij, Decoct. Hord. Ojss.), turpentine (Sp. Tereb. ʒij, Ol. Oliv. ʒij, Decoct. Hord. Ojss.), assafoetida and rue (Tinct. Assaf. ʒij, Olei Rutæ mʒx, Dec. Hord. Ojss.). When with tympanitis there is protracted constipation, one or two teaspoonfuls of castor-oil in peppermint water may be given by the mouth; but more commonly there is diarrhœa, and then the proper remedies are turpentine (as prescribed at pp. 302, 653),^b charcoal, acetate of lead, or one of the antiseptic remedies already referred to (p. 644). Dr. Peter of Paris has found ice-poultices, made by scattering small fragments of ice over a thick layer of linseed meal, most effectual for subduing the tympanitic distention.¹ Failing these measures, the gas may be drawn off in large quantity by a long tube passed into the colon. It must not be forgotten in the treatment of tympanitis that it is often a symptom of peritonitis, and that in the typhoid state it may be a sign of debility, requiring stimulants and the remedies recommended under the head of typhus. (See also p. 656) A

5. *Abdominal Pain* is usually relieved by assiduous fomentation, or poulticing of the abdomen; and when these measures fail, a dessertspoonful of laudanum may be added to the poultice, or turpentine-stupes may be applied to the abdomen

^b Dr. Wood of America recommends turpentine in all cases of enteric fever where there is tympanitis and a dry tongue. In certain cases, where the tongue, after cleaning, becomes dry, red, and smooth (a symptom which, he thinks, indicates great danger, and at all events slow cicatrization of the intestinal ulcers and a protracted convalescence), he regards turpentine almost in the light of a specific. He gives it in doses of from 5 to 20 minims every hour, or every second hour. (*Prat. of Med.* 2nd ed. 1849, i. 328.)

¹ *Brit. Med. Journ.* 1869, ii. 450.

at intervals. When the pain is severe, an opiate may be given by the mouth or rectum; or, if the patient be young and robust and in an early stage of the fever, from 2 to 6 leeches applied over the right iliac region, or round the anus, often give great and immediate relief.

6. *Epistaxis* is usually slight, and requires no treatment; but when profuse, it must be checked without delay (p. 543). Gallic acid and turpentine, or tincture of ergot, may be given every hour, or ergotine may be injected subcutaneously in the manner recommended for intestinal hæmorrhage. At the same time a bladder containing ice is to be applied over the forehead and nose, while a solution of alum or tannine, or an infusion of matico or rhatany, may be injected into the nostrils. If these measures fail, the nares must be plugged.

VI. *Obviate and Counteract Complications.*

Most of the complications of enteric fever demand the same treatment as the corresponding complications of typhus (p. 303), care being taken to abstain from all remedies calculated to irritate the bowels.

Among the complications peculiar to enteric fever, the most important is—

1. *Peritonitis*. Although the cause of the peritonitis cannot always be determined with certainty (p. 565), in the great majority of instances it is perforation of the bowel. The case, though desperate, is not altogether hopeless (p. 571). Opium is the only remedy to be relied on in such cases; but to be of service, it must be given immediately and boldly. To an adult, 2 grains of solid opium may be given at once, followed by 1 grain every second or third hour, till slight stupor is induced. When the stomach is irritable, the subcutaneous injection of morphia is preferable to opium by the mouth. The doses will vary with the age and other conditions of the patient, but the amount of opium tolerated is often extraordinary: as much as 60 grains have been taken in three days with benefit. The opium is to be given alone, and not in combination with calomel, which brings down more bile into the lower bowel, and so excites peristaltic action. The object is, not to produce absorption of lymph (even if mercury had the power to do this), but to paralyse the movements of the bowels, so as to prevent the escape of their contents into the peritoneum, and favour the formation of adhesions. Many writers have recommended the

application of leeches to the abdomen on the supervention of peritonitis, but the extreme prostration, and the circumstance that the tendency is to death by asthenia, contra-indicate such a practice. The pain and tension of the abdomen will also be relieved by warm fomentations, bran-poultices, and turpentine-stupes; but a much more certain method of subduing the inflammation is covering the abdomen with a bladder of ice, or with the ice-poultice referred to under the treatment for tympanitis. At the same time the patient must be kept in a state of absolute rest, and on no account raised in bed, and the ingesta ought to be liquid, and given in such small quantities at a time that they can be absorbed by the stomach. A table-spoonful of milk or of iced brandy and water may be given every hour, or every half-hour. The large quantities of food and stimulants sometimes given cannot fail, in my opinion, to be injurious. Dr. Joseph Bell, indeed, treated several cases to a successful termination with opium and absolute starvation; for the first two or three days he allowed nothing in the way of nourishment except a table-spoonful of water, or of toast-water, every quarter of an hour.¹ If the case does well, we must beware of interfering with the constipation induced by the opium: cases are recorded where the incautious administration of a purge appeared to break up the adhesions and produce a fresh and fatal attack of peritonitis. When the symptoms of perforation are followed by great abdominal distension, E. Friedrich² and others¹ have recommended drawing off the intestinal gases by paracentesis.

Notwithstanding the measures here recommended, peritonitis, as a rule, terminates in death; and hence it is imperative to do all in our power to avert its occurrence. Bearing in mind that rupture of the denuded peritoneum is one of the ways in which perforation takes place, it is obviously of importance to prevent every movement which would favour such a laceration. Attention to this point is particularly necessary in mild cases, in which the patient is able to get up without assistance, and in which perforation is very apt to occur (see pp. 588, 623). It is a good rule not to allow the patient to get out of bed to the night-chair, after the fourteenth day of his illness, until convalescence is fairly established, and not even then, if there be reason to believe that the ulcers have become atonic instead

¹ BELL, 1860, viii. 386.

² *Prag. Vierteljahrs. f. prakt. Heilk.* 1868, C., 11.

¹ STEIN, *Deutsch. Arch. f. Klin. Med.* 1869, vi. 454.

of cicatrizing. In the advanced stages of the disease, the physician ought also to be very careful in the way in which he manipulates the abdomen; and throughout the disease all strong purgatives and solid food are to be avoided.

2. For *Laryngitis* a small blister may be applied on either side below the angles of the jaw, while the whole neck is enveloped in a poultice, and the different measures recommended under the head of typhus for acute oedema of the glottis (p. 303) are resorted to. If these measures fail, and suffocation appears imminent, tracheotomy ought to be performed without delay, and it is satisfactory to know that in a large number of cases the operation has been successful.^m

Treatment during Convalescence.

Patients recovering from enteric fever require far more care and watching than those convalescing from typhus. While the intestinal ulcers are cicatrizing, it is obvious that much mischief may be done by purgatives and improper diet. The bowels may be opened by aperients every second day, if necessary; but for a month after the cessation of pyrexia, small doses of castor oil and simple enemata are the only means which should be resorted to for this purpose. Notwithstanding the cravings of the patient's appetite, the diet must be at first restricted to such articles as milk, eggs, farinacea, custards, light puddings, beef-tea, chicken-tea, or calf's foot jelly. Meat ought not to be allowed for at least seven days after the cessation of pyrexia, and not even then if there be any signs of intestinal disturbance; and before meat is given, it is well to try for a day or two a piece of boiled sole, smelt, or whiting. Malt liquors ought not to be given before meat, as they are apt to derange the bowels. When convalescence is slow, quinine, the mineral acids, iron, cod oil, and change of air are indicated.

When diarrhoea persists during convalescence, the acetate of lead, sulphate of copper, or nitrate of silver, must be given in the manner already prescribed (p. 651-2), and the patient must

^m Pachmayr has collected 46 cases in which tracheotomy was performed for 'perichondritis laryngea' in enteric fever. Of the 46, 26 died, 6 during the operation, 6 within a few hours, and the remainder between the third and forty-seventh days. The causes of death were asphyxia (13), hæmorrhage (3), pyæmia (3), pneumonia (3), gangrene of lung (3), and pericarditis (1). (*Verhandl. der phys. med. Gesellschaft in Würzburg*, 1868, Bd. I.) For successful cases, see also TROUSSEAU, 1861, p. 197, and SCHMIDT's *Jahrb.* vol. cxix. p. 334; vol. cxxxiv. p. 114; vol. cxxxv. p. 241; vol. cxxxvii. p. 263.

be kept in bed. At the same time it is well to remember a remark of Trousseau, that when there is great emaciation, especially in cases which have been treated on too lowering principles, vomiting and purging during convalescence may be of a purely nervous character, and at once relieved by solid food.^a

The liability to perforation, hæmorrhage, or a relapse, when convalescence appears to be progressing favourably, must always be borne in mind, and in every case it is important to continue taking the temperature once every evening for at least two weeks after the commencement of convalescence.

^a TROUSSEAU, 1861, p. 188.

CHAPTER V.

ON THE SPECIFIC DISTINCTIONS OF TYPHUS AND
ENTERIC FEVER. x

I PURPOSE in this chapter to consider the chief arguments in support of the specific distinctness of typhus and enteric fever, derived, in the first place, from their symptoms and *post-mortem* appearances, and, in the second, from their etiology.

A. *Symptoms and Post-Mortem Appearances.*

On comparing the clinical history and anatomical lesions of the two diseases, an impartial observer cannot fail to admit that typical cases present a striking contrast. On the one hand, we have a fever of a more or less remittent type with a definite anatomical lesion, which is characterized by lenticular rose-spots appearing in successive crops; diarrhœa, abdominal tenderness, hæmorrhages from the bowels and nose, and dilated pupils, and which lasts, on an average, between three and four weeks: on the other, we have a fever of a more continued character with no definite anatomical lesion, which is characterized by a measly eruption, the spots of which often become converted into petechiæ, by a peculiar odour, and by a great tendency to stupor and contraction of the pupil, and whose average duration, when uncomplicated, rarely exceeds fourteen days. But although the clinical histories of the two diseases are in most cases widely different, there can be no doubt that many symptoms are common to both, and that certain symptoms which characterize one are sometimes absent, or are occasionally observed in the other; for example, that typhus fever may be complicated with diarrhœa or hæmorrhages, or the bowels may be confined in enteric fever, while pyrexia and the typhoid state are common to both maladies. Still, even in such cases, if one or other of the eruptions be present, a diagnosis as to the condition of the intestines may be made with certainty. If in the circumstances referred to, there be no eruption, the diagnosis may be difficult; but, as Louis long ago observed, x

the difficulty is not greater than is often experienced in the diagnosis of other maladies, which, as a rule, are most easily distinguished.^o Practically, the cases are very rare in which a diagnosis cannot be made; the difficulty far oftener arises in diagnosing enteric fever from other diseases universally acknowledged to be distinct (see pp. 591 and 594).

From my own observations, and from a careful study of the recorded observations of other physicians, I believe that the two following propositions will be found to hold good.

1. *When lenticular rose-spots, as described at page 509, appear in successive crops in the course of continued fever, the abdominal lesions of enteric fever are invariably present.*

2. *When the eruption of typhus, described at pages 130 and 512, shows itself in the course of continued fever, the abdominal lesions of enteric fever are absent.*

In addition to the evidence in support of these two propositions already adduced (see pp. 251-4 and 423-435, 612), it may be mentioned that during twenty-three years, upwards of a thousand autopsies of patients dying of fever were made at the London Fever Hospital, without a single exception being met with.

Statements of an opposite nature have occasionally been made; but the small number of cases adduced in their support shows that the exceptions are very rare, while, in my opinion, most, if not all, of them are liable to one or other of the following objections.

1. No definite signification has been attached to the names employed to designate the eruptions; and arguments have been founded on the names given to the eruption by different observers, instead of on the characters of the eruption in each case. There can be no doubt that much confusion has arisen in discussing the question, from different observers employing the same name to designate different eruptions. Thus, one writer who upholds the identity of typhus and enteric fever speaks of the characteristic rose-spots of enteric fever becoming converted into petechiæ (in a case where the intestines were healthy); a second argues as if all cases of continued fever with 'maculæ' were typhus, and as if enteric fever had no peculiar eruption; a third applies the term 'rose-spots' to the lighter eruption of typhus; a fourth uses the term 'rose-coloured petechiæ'; while a fifth records a characteristic case

of 'typhoid fever' (*sic*) with a 'mulberry-rash.' This want of precision in nomenclature accounts for some of those cases where typhus and enteric fever have been said to have a common origin. For example, a case was reported a few years since in one of the medical journals, which was thought to prove to demonstration that typhus and enteric fever arose from one poison. The evidence simply amounted to this. The physician who reported the case had under his care one member of a family who had fever with successive crops of 'rose-spots,' and he was informed by another practitioner that a second member of the same family had fever at the same time, with a 'mulberry-rash.'^p Whatever were the facts of the case, the evidence failed entirely in establishing the conclusion which was drawn from it. If the physician in question had turned to the number of the journal, preceding only by a fortnight that in which his case was reported, he would have found the account of a case of 'typhoid fever' (*sic*) with 'marked symptoms,' one of these marked symptoms being 'a very distinct mulberry-rash' over the body. Again, another physician refuses to allow that there is any difference between the lenticular rose-spots of enteric fever and the eruption of typhus, and yet, in order to prove that the two fevers are the same, he records two cases in which a 'typhus eruption' was observed during life, and the anatomical lesions of 'typhoid fever' were discovered after death; but unless a definite meaning be attached to the term 'typhus eruption,' as distinct from the eruption of enteric fever, it is needless to discuss the question. As Jacquot observed respecting the only French surgeon in the Crimean army who maintained that the lesions of dothienenteritis were found in typhus, 'Comme il confesse qu'il ne peut distinguer un typhus d'une fièvre typhoïde, son assertion n'a dès lors plus rien d'étrange.'^q

2. The lighter florid spots of typhus have been mistaken for the eruption of enteric fever. The spots of typhus, at their first appearance, are often slightly elevated above the surface and disappear upon pressure, and, if they be accompanied by no mottling, as sometimes happens, it may at first be difficult to distinguish them from 'lenticular rose-spots.' But if these spots be watched for twenty-four or forty-eight hours, they become darker and cease to disappear on pressure, and they are usually associated with mottling. These very changes

^p *Lancet*, Feb. 6th, 1858.

^q JACQUOT, 1858, p. 256.

characterize the eruption of typhus, and are inconsistent with that of enteric fever (see pp. 131 and 510). It is not surprising, then, that the lesions of enteric fever were absent in a case reported by Dr. Kennedy, of Dublin, to the Medico-Chirurgical Society of London, where some of the spots, thought to be characteristic of enteric fever, were indistinguishable from true petechiæ, at the end of the fourth day from their first appearance.* It is probable that most of the cases in which rose-coloured spots have been reported to coexist with petechiæ, or with a mulberry-rash, admit of a similar explanation. It is worth mentioning that Huss, whose work is so often referred to as proving the identity of typhus and enteric fever, and who speaks of the frequent coexistence of '*taches rosées lenticulaires*' with the petechial eruption of typhus, does not allude to the florid spots which precede, and are converted into, the petechiæ of typhus, and which at first may be slightly elevated and disappear on pressure. Huss's '*taches lenticulaires*' (synonymous with his '*éruption typhoïde*') included all the spots met with in fever which were neither petechiæ nor sudamina.† This fact must be borne in mind in studying his work. It sometimes happens in typhus that spots disappearing on pressure are found co-existing with petechiæ, but the important point is, that when any of the spots cease to disappear on pressure, or become converted into petechiæ, the eruption is not that of enteric fever, and the intestines are found to be healthy after death.

3. 'Petechiæ' have been regarded as the characteristic eruption of typhus. They are met with, however, in many diseases besides typhus; while, as before stated, the eruption of typhus may never become petechial (see p. 133). Petechiæ, therefore, strictly defined (p. 132), are not the characteristic eruption of typhus; and the circumstance of their having been observed in certain cases of fever, where the intestines have presented the lesions of enteric fever after death, is no proof that typhus and enteric fever are identical.

4. Other morbid conditions of the Peyerian and solitary glands of the intestine, such as that produced by the deposit of tubercle, the shaved-beard appearance of French pathologists,

* 'At the end of the fourth day from their first appearance, some few of them I could not distinguish from genuine petechiæ. These were of a much larger size, darker colour, and more irregular outline than the rest.' *Med. Times and Gaz.* March 17th, 1860; and *Lancet*, March 24th, 1860.

† Huss, 1855. p. 86.

" We often see in Basle, as in London,
both typhoid and typhus fever, and yet
have never, in fourteen years, observed a
single case which could be proved to
be anatomically & clinically intermediate."

H. Lebert, Lehrbuch Cyber
g. med. I. 248.

or the slight enlargement which is observed in scarlet fever, small-pox, and many other diseases, and even their healthy state, have been mistaken for the specific lesions of enteric fever (see p. 625). Dr. H. Kennedy, one of the most strenuous opponents of the specific distinctness of typhus and enteric fever, admits that he has sometimes found it impossible to distinguish between the lesions of the latter and tubercular disease of the intestines, and asks if the intestinal lesions of enteric fever may not be due to the strumous diathesis? The late Dr. Joseph Bell of Glasgow maintained that the anatomical lesions of typhus and enteric fever were identical, and that, in fact, there was no such thing as typhus without the intestinal lesions of enteric fever. The contrary statements of many distinguished observers were met by the assertion, that the lesions were sometimes so insignificant as to require a lens for their discovery.^u The lesions of enteric fever, however, require no lens for their discovery at the earliest date at which death ever occurs.^v

Tried by the above four tests, it will be found that the cases are extremely rare which in any way impugn the correctness of the propositions laid down at the commencement of this chapter.

At the same time, I am prepared to admit that in very rare cases the eruptions of typhus and enteric fever may co-exist, and that if death take place under such circumstances the lesions of enteric fever will be found in the bowel. But if such rare cases be employed to prove the identity of typhus and enteric fevers, the same line of argument would necessitate the conclusion that all the acute specific diseases spring from one poison—that, in fact, small-pox, scarlet fever, and enteric fever are the same disease. It has already been shown in this work, that typhus and scarlatina, enteric fever and scarlatina, and also variola and typhus, occasionally co-exist in the human system (pp. 225, 583.) The facts recorded by Marson^w and many other observers prove beyond doubt that persons may be attacked the same time by variola and scarlatina, and I have elsewhere collected numerous instances, demonstrating the contemporaneous existence in the system of almost any two of the diseases

^u KENNEDY, 1860, p. 224; and 1873.

^v BELL, 1860.

^w I have employed a lens in examining the intestines of several cases of typhus fatal after the tenth day, but I have never discovered anything in the least resembling the lesions, such as I have seen as early as the second or sixth day of enteric fever (see page 613). Barrallier also employed a lens, and came to the same conclusion. (Vide ante, p. 253.)

^x Med. Chir. Trans. vol. xxx.

which are believed to spring from different specific poisons.* If one poison can generate a certain group of symptoms, and a second poison generate another group, a combination of the two poisons may give rise to a third group of symptoms, partaking of the characters of the two first, without necessitating the conclusion that the first two groups of symptoms are merely different manifestations of the same poison. Some years ago I published the reports of three cases, in which the patients appeared to suffer simultaneously from both typhus and enteric fever, in consequence of exposure to the poisons of both diseases.^y In the two following instances, patients contracted typhus in the London Fever Hospital, while still suffering from enteric fever, for which they had been admitted:—

CASE LXXXVIII. *Co-existence of Typhus and Enteric Fever.*

George B——, aged 14, adm. into L. F. Hosp. *June 3rd*, 1862. He had been ill for ten days; and on admission, he presented all the ordinary symptoms of enteric fever. Pulse 108. Tongue moist and fissured; belly distended and tender over cæcum; 2 watery stools. Several well-marked lenticular rose spots. Two of this boy's sisters had been admitted about a fortnight before with the same fever, which had run the usual course. Both had lenticular rose spots, and one died of intestinal hæmorrhage. The boy was placed in a ward in which were many patients suffering from typhus.

On *June 12th*, fresh lenticular spots were noted as appearing; skin warm and dry. Tongue moist and fissured; belly tender; bowels still relaxed. Pulse 80. Intelligence clear. Slight headache. *June 17th* (about 22nd day). Tongue red and dry in centre; belly tender and tympanitic; one stool. Lenticular spots still distinct, and trunk covered with a dusky mottling like that of typhus. Pulse 90. Headache much increased. *June 18th*. The mottling has developed into an unmistakable typhus-rash, in midst of which can be singled out a few pink, circular, elevated, lenticular rose spots of enteric fever, which had previously been encircled with ink. *June 19th*. Pulse 90. No motion for two days. Expression stupid, and is a little confused when spoken to. *June 20th*. The mottling has faded a little, but is still distinct. Several fresh lenticular spots. To-day the patient was visited by Dr. A. P. Stewart, who was satisfied as to existence of both eruptions. Bowels still confined. *June 21st*. One fresh lenticular spot; mottling remains. No fresh lenticular spots appeared after this date; but the mottling was still visible on *June 26th*. The patient was discharged well on *July 8th*.

* MURCHISON, 1859 (4).

^y Ibid. p. 197.

CASE LXXXIX. *Co-existence of Typhus and Enteric Fever.*

Henry W——, aged 25, adm. into L. F. Hosp. Jan. 10th, 1853, having been taken ill on the 6th. He was brought from Croydon, ten miles distant from London, where enteric fever (but not typhus) had been very prevalent for some months. Another patient suffering from enteric fever was admitted at the same time, from the same house. There were several cases of typhus in the wards in which these patients lay. The chief symptoms in Henry W—— were giddiness, headache, vomiting, flushing of face, disturbed sleep, loss of appetite, thirst, a variable pulse, and lenticular rose spots. Several of these spots were noted as late as Feb. 2nd (28th day). On Jan. 30th (25th day), patient complained of irregular chills, alternating with flushing. The headache returned; and the tongue, which a few days before had been clean and moist, became coated. The pulse, which for several days had never exceeded 72, rose to 86. For the next few days, patient complained greatly of headache, pains in the limbs, thirst, and diarrhoea. On Feb. 4th, pulse was 120, and body was covered with a well-marked typhus-eruption consisting of spots and mottling. The bowels were moved ten times. The rash continued very copious for ten days, and all this time the bowels were much relaxed. On Feb. 5th, there was copious epistaxis. There was occasional delirium, and for five days pulse remained at 132, without any variation. Between the 40th and 41st days, or about the 14th day of the attack of typhus, pulse fell from 120 to 72, and from this date the patient convalesced rapidly.

In the following case, the patient appeared to have been exposed to the poisons of both typhus and enteric fever before admission into the hospital.

CASE XC. *Supposed Co-existence of Typhus and Enteric Fever.*

Norah H——, aged 16, adm. into L. F. Hosp. in Dec. 1857, on the eighth day of an attack of fever. Her body was covered with a well-marked typhus-eruption, composed of spots and mottling, and she presented all the ordinary symptoms of typhus, viz. a dry, brown tongue; confined bowels; heavy confused expression; small pupils and low wandering delirium. On the 11th day, the typhus-eruption faded, and was succeeded by lenticular rose spots, which came out in successive crops for more than a week, and were accompanied by diarrhoea, abdominal tenderness, red tongue, and dilated pupils. A fortnight before this girl's admission, she had slept away from home, in the same bed with another girl who had 'fever.' The father and brother of this second girl were admitted into the Fever Hospital with well-marked typhus. On the other hand, it was ascertained that in the house where Norah H—— lived, the drainage was very bad, and that the water-closet had been greatly neglected, so as to become most offensive.

Since the publication of these cases, several equally conclusive have been noted by other observers. One has been observed by Peacock,² in which the rash of typhus appeared on the 23rd day of enteric fever; three by T. J. Maclagan;^a one by Dr. M. Ward;^b and one by J. W. Miller.^c From these observations it is evident that the occasional co-existence of the eruptions of typhus and enteric fever, or even the discovery in rare cases of the lesions of enteric fever in a case where a typhus eruption has been observed during life, is no proof that the two fevers in question spring from one poison. These occurrences are very rare exceptions to a general rule, and are, in fact, not more common than the co-existence of enteric fever and scarlatina, or of scarlatina and variola. Since 1861, the patients in the London Fever Hospital with typhus have been treated in different wards from those with enteric fever; in nine years (1862-70) there were admitted 14,589 cases of the former disease, and 3,555 of the latter, but in only two instances, and these very doubtful, was there any suspicion of the two diseases commingling. It cannot therefore be said that typhus and enteric fever are constantly gliding into one another.

57 The observations made by Landouzy on the epidemic in the jail of Rheims in 1839-40, which have been so often referred to as proving the identity of typhus and enteric fever, must be viewed in connection with the cases now narrated. The fever attacked 138 persons, of whom 17 died. It resembled typhus in being very contagious, in its short duration, and in being characterized, in most cases, by constipation, congestion of the conjunctivæ, great stupor, the early occurrence of delirium, a mousy odour, and the presence of the typhus-eruption. It also attacked those persons who had previously had enteric fever, but spared those who had suffered from typhus twenty-five years before. On the other hand, it is stated that in some of the cases lenticular rose spots were mixed up with the eruption of typhus. This statement is fairly open to the objection, that Landouzy did not admit that the spots of typhus ever disappeared on pressure, and that he seemed to doubt if the spots of this nature, described by Stewart as existing in typhus, were not lenticular rose spots.^d In 6 of the 17 fatal cases, however, the intestines were examined, and were said to present the lesions of enteric fever. Two only of the 6 cases

² PEACOCK, 1862, p. 138.

^a MACLAGAN, 1867 (2).

^b *Med. Press and Circ.* Feb. 13th, 1867. ^c MILLER, 1868; see also KENNEDY, 1866.

^d LANDOUZY, 1842, p. 325.

are recorded, with regard to which it has been justly observed that the lesions were not so characteristic of enteric fever as Landouzy stated.⁶ In one of the two cases they were so slight, that Landouzy's three colleagues and the pupils, after opening the intestine and examining it most carefully, exclaimed, at first, that to their great surprise they could find no disease.⁷ But even admitting the facts, as stated by Landouzy, they do not prove the identity of typhus and enteric fever. Bartlett, in the first edition of his work, suggested that the causes of the two fevers were commingled at Rheims, and that a hybrid progeny was the result.⁸ It is generally admitted that the causes of enteric fever are in constant operation throughout France, while it has been shown that the end of autumn (when the epidemic at Rheims commenced) is the season most favourable to these causes being called into action. On the other hand, the prisoners were exposed to the recognized cause of typhus. The origin of the epidemic, in fact, was attributed to over-crowding (*vide ante*, p. 107). It is remarkable, that Landouzy himself arrived at the conclusion that the fever at Rheims was *not identical* with the ordinary typhoid fever of France, although his observations have been so often quoted in corroboration of an opposite opinion. / Z

B. *Etiology.*

Still more conclusive arguments in favour of the specific distinctness of typhus and enteric fever are derived from a study of their etiology (see *Introduction*, p. 5).

1. *The two fevers have no community of origin.* One fever does not give rise to the other. If typhus and enteric fever sprang from the same poison, it ought to be a matter of daily observation to see one fever propagating the other, and the two fevers prevailing together in the same family or house. But experience is opposed to anything of the sort.

In 1849, Sir W. Jenner showed, as the result of an investigation of the cases of fever admitted into the London Fever Hospital during three years, that, when continued fever broke

* 'We doubt whether M. Landouzy has made out his case; the alterations he signalizes are not sufficiently defined to bring them within Louis' definition of typhoid fever' (*Brit. and For. Med. Chir. Rev.* July, 1851). 'The appearances Landouzy describes are perfectly well-known to the German observers, as dependent on a catarrhal condition of the mucous membrane, which may occur in typhus, as in pneumonia or any acute disease. No accurate observer could confound this with typhoid deposit in and under Peyer's patches' (*FLINT*, 1852, p. 243).

⁶ LANDOUZY, 1842, p. 316.

⁸ BARTLETT, 1842.

out in a family or house, all the cases were typhus, or all were enteric fever, the two fevers never prevailing together; and hence he argued, that their specific causes must necessarily be absolutely different.^h

My own experience is in accordance with Sir W. Jenner's. I have repeatedly known from ten to six members of one family, whose ages varied from two to upwards of sixty, attacked with typhus, everyone having the characteristic rash. And so with enteric fever; if one case in a family has been enteric fever, all have been enteric. Neither age, sex, temperament, nor any individual peculiarity, has in the least affected the form of fever. During twenty-three years (1848-70), 18,268 cases of typhus and 5,988 cases of enteric fever, were admitted into the London Fever Hospital. Very frequently, many members of one family, or residents in one house, were admitted at the same time, but cases of typhus and enteric fever were never brought from the same house, except after the lapse of many months, or even years. There were five or six exceptions which deserve notice, as indicating the caution necessary in investigating such cases. A boy, aged 16, was admitted on September 19, 1848, with enteric fever, and on October 10 his father was admitted with typhus. But the mother of the boy had visited him in the Fever Hospital, whence she might have carried the poison of typhus to her husband. The father, moreover, had been little exposed to any contagium emanating from the son, who, being a vagabond at variance with his father, *was from home when he was taken sick*. The circumstances of another exceptional case were as follows:—In November and December, 1851, four servants were admitted from an hotel in the Haymarket, all with enteric fever, and in the following January a servant was admitted from the same house with typhus. This typhus patient, however, was one of the same four who had been admitted in the previous year with enteric fever. She had only left the Fever Hospital about ten days previous to her re-admission; and she had no doubt contracted typhus there, during her convalescence. In the other exceptional cases the friends of patients in hospital with enteric fever caught typhus from visiting them there.

Dr. Peacock and Dr. Wilks have invariably found the same rule to hold good at St. Thomas's, the Royal Free, and Guy's Hospitals; ⁱ Dr. A. P. Stewart has assured me, that during

^h JENNER, 1849 (1).

ⁱ PEACOCK, 1856 (1); WILKS, 1855.

twelve years he never met with a single exception at the Middlesex Hospital.

These observations are not, as has been alleged, confined to London. In 1842, Dr. John Reid pointed out that all the cases of enteric fever, which had been dissected in the Edinburgh Infirmary during three and a half years, had been brought from Linlithgow, Anstruther, and other places in Fifeshire, and not one from Edinburgh itself, where typhus had been very prevalent; while Professor Goodsir showed, as the result of numerous *post-mortem* examinations, that all the cases of fever which he had observed at Anstruther during five years had been enteric.^j In 1846-7, enteric fever was unusually prevalent at Edinburgh, but it was shown by Drs. Waters^k and W. Robertson^l that the cases occurred in the neighbourhood of Edinburgh, or in the better parts of the New Town, where typhus was scarcely ever observed. Dr. W. T. Gairdner's experience in Edinburgh during ten years was the same. In 1860, he wrote thus:—'In Edinburgh, Dr. Begbie and myself probably have seen, or have had the means of knowing about, very nearly all the fever cases; and, therefore, when I declare to you, that, within my experience for ten years past, no instance has occurred of a decided origin of enteric fever in a group of typhus cases, or of typhus fever in a group of enteric cases, I am entitled to say that I have obtained very strong evidence in corroboration of the views that these two diseases are in reality different diseases, and not mere varieties of the same disease. Last summer, I made a very careful survey of the whole fever-field of Edinburgh (if I may call it so), for several months together. It was not an epidemic season; but I gathered about thirty cases of typhus and twelve of enteric fever, and into the whole details of these I enquired with the greatest possible minuteness, visiting every one of the fever-localities, except one or two in which I was quite sure the cases were isolated. The result was, that in no case could I light upon a suspicion that typhus had given rise to anything but typhus; or enteric fever, to anything but enteric fever.'^m

Dr. A. P. Stewart's experience in Glasgow during 1836-37-38 was of a similar nature. He tells me that he saw upwards of 3,000 cases of fever during that period, but not one

^j REID, 1840 and 1842.

^k WATERS, 1847.

^l ROBERTSON, 1848.

^m GAIRDNER, 1859 and 1860.

instance of typhus and enteric fever occurring together in the same family or house. More recently, Dr. J. B. Russell has investigated the localities whence all the patients with enteric fever were brought to the Royal Infirmary and City of Glasgow Fever Hospital, and states that a most noteworthy fact was 'the immunity from enteric fever of the district which are the chief haunts of typhus.'^a

Lastly, thirty-two years' study of fevers in Ireland has satisfied Dr. A. Hudson that typhus and enteric fever differ entirely, not merely in their clinical history and pathology, but also in their genesis and mode of diffusion.^o

Such is the nature of the evidence, from which it is inferred that typhus and enteric differ in their mode of origin. A few observations of an opposite nature have been recorded; but in all the instances with which I am acquainted, the observers of the facts refuse to acknowledge that typhus and enteric fever can be distinguished during life, while one physician, who says that he has met with numerous instances of 'typhus' and 'typhoid fever' occurring together in the same family, maintains not only that the eruption of the one fever is convertible into that of the other, but that the anatomical lesions of the two fevers are identical, and that, in fact, there is no such thing as typhus fever without the intestinal lesions of enteric fever.^p The argument against the specific distinctness of the two fevers, that they cannot be distinguished by their symptoms during life, is perfectly intelligible; but it is difficult to understand, what writers holding this view (or, still more, holding the view that the anatomical lesions of the two fevers are identical) imply by 'typhoid fever' as distinct from 'typhus,' when they say that they have often met with examples of these two fevers at one time in the same family. Surely, this is attempting to prove too much.

With one exception, recorded by HUSS, I know of no instance of fever breaking out in a family, *in which the intestines have been found healthy in one member, and presenting the anatomical lesions of enteric fever in another.* Such occurrences ought not to be rare, if the two fevers so often occur together, as has been stated. Moreover, exceptional cases of the nature alluded to do not prove that typhus and enteric fever spring from the same poison, unless it can be shown that they occur more frequently than examples of the simultaneous occurrence, in

^a RUSSELL, 1867, p. 63.

^o HUDSON, 1867, p. 185.

^p BELL, 1860.

the same family, of other specific diseases which are universally acknowledged to be distinct. I have, on several occasions, known typhus and scarlatina, typhus and measles, typhus and small-pox, or enteric fever and scarlatina, occur at the same time in the same house. Sir W. Jenner also has made similar observations. A Little weight would be attached to an opinion founded on such cases, to the effect that typhus, scarlatina, measles, and variola are all one disease. 9/

There are several ways, in which the co-existence of typhus and enteric fever in the same house can be accounted for. For example, patients with enteric fever treated in a hospital where there is typhus may carry the poison of the latter to their own homes, and thus become foci for the propagation of typhus at places where there had only been enteric fever previously. In the case of large towns, where the two fevers so often prevail at the same time, it is surprising (even on the supposition that the poisons are distinct) that they occur together in the same house so rarely as is found to be the case.

2. *An attack of one fever confers an immunity from a subsequent attack of itself, but not of the other.* While it is extremely rare for the same individual to have two attacks of typhus, although second attacks of enteric fever are more common (see pp. 194 and 469), there are numerous examples of persons contracting both of these fevers under favourable circumstances. It has repeatedly happened at the London Fever Hospital, that patients, after having convalesced from an attack of enteric fever, have contracted typhus while still in hospital, or have been re-admitted with it within a week or ten days of their discharge; while, in rarer cases, an attack of typhus has been succeeded by enteric fever. I have notes of 23 patients who contracted typhus at an interval of from a few days to three years after enteric fever, of whom 3 died; and of 7 patients who contracted enteric fever at an interval of from a few days to seven years after typhus, of whom 1 died. In fatal cases of enteric fever following typhus, the recent abdominal lesions of enteric fever are found in the dead body; but when the sequence of the fevers is reversed, we find only the cicatrices of the old intestinal ulcers. #

Similar observations have often been made elsewhere. During the summer of 1859, 12 cases of enteric fever were admitted into the Edinburgh Royal Infirmary under the care X

X of Dr. W. T. Gairdner. There were cases of typhus in the same ward. After a distinct convalescence, 4 of the 12 cases were attacked with typhus, and 1 died of it: the eruptions in the two fevers were most characteristic.^a Dr. H. Weber and Dr. Gueneau de Mussy have each communicated to me a case, in which an attack of enteric fever was followed by typhus: one occurred in London, the other in Dublin. Two similar cases have been observed by Gull and Wilks^r in London; 2 by Davies,^s at Bristol; 4 by Hudson,^t in Dublin; 4 by MacLagan,^u at Dundee; 1 by Anderson,^v in Glasgow; 2 by Griesinger,^w at Zurich; 1 by Godélier,^x in Paris; and 4 are mentioned by Flint^y and Bartlett,^z as having been observed in America. Many similar observations were made by Barrallier, at Toulon,^a and by the French officers in the Crimean army.^b M. Baudens communicated to the French Academy the cases of two French surgeons, who died of typhus in the Crimea, in whose intestines were found the cicatrices resulting from an attack of enteric fever, from which they had suffered four or five years before.^c On the other hand, Corrigan records the case of a patient recovering from typhus at Dublin, who was seized with enteric fever and died;^d a similar case is mentioned by Bartlett;^e Hudson relates the case of a gentleman, who was attacked with enteric fever years after having passed through both relapsing fever and typhus;^f and Jacquot alludes to several instances, in which soldiers, who had passed through typhus in the Crimea, were shortly after attacked by enteric fever in France.^g

The following cases illustrate the sequence of the two fevers alluded to:—^h

CASE XCI. *Enteric Fever followed, nearly three months after commencement of Convalescence, by a fatal attack of Typhus.*

Francis B——, aged 34, adm. into L. F. Hosp. Oct. 14th, 1854. This man had all the symptoms of a very severe attack of enteric fever. The lenticular rose spots were numerous and most characteristic, and came out in successive crops. The pulse varied between 72 and

^a GAIRDNER, 1860.

^b *Ibid.* 1867, ii. 427.

^c MACLAGAN, 1867 (2).

^d *Med. Times and Gaz.* Dec. 21st, 1861.

^e FLINT, 1852, pp. 314, 342.

^f BARRALLIER, 1861, p. 105.

^g BARRALLIER, 1861, p. 105.

^h BARTLETT, 1856, p. 294.

ⁱ JACQUOT, 1858, p. 225.

^r *Med. Times and Gaz.* 1864, ii. 194.

^s HUDSON, 1867, p. 44.

^t ANDERSON, 1861, p. 116.

^u GODÉLIER, 1856, p. 887.

^v BARTLETT, 1856, p. 293.

^w JACQUOT, 1858, p. 225.

^x CORRIGAN, 1853, p. 91.

^y HUDSON, 1867, p. 44.

^z See also Case LXI, p. 555.

108. There was a circumscribed pink flush on both cheeks. The tongue, at first red and glazed, ultimately became dry and brown; the abdomen was greatly swollen and tender; there was diarrhoea and hæmorrhage from the bowels, acute delirium, and much tremor. After the attack had lasted fully a month, convalescence commenced about Nov. 5th, but was retarded by extensive bed-sores. On Nov. 17th he was put on full diet, with a chop and a pint of porter.

The patient was kept in hospital on account of the bed-sores, but was making a good recovery, when about Jan. 29th, 1855, he lost his appetite, and felt generally unwell. On Feb. 3rd, a faint, red, mottled typhus-eruption made its appearance on the chest. On the 4th, this eruption extended over the trunk and arms, and became much deeper in colour, and it did not disappear on pressure. There was great somnolence, but no abdominal symptoms. On Feb. 8th, the pulse was above 150, feeble, and irregular; respirations 36, with much dyspnoea. At 10 p.m. of the 11th, or about the 14th day of the attack of typhus, the patient died.

Post-Mortem Examination.—Extreme emaciation. Extensive bed-sores over sacrum and hips, and on outer aspect of both ankles. Livid patches on knees, simulating commencing gangrene. A considerable amount of sub-arachnoid serosity. Six drachms of serum at base of cranium, and $1\frac{1}{2}$ drachm in lateral ventricles. Over whole of both hemispheres was a delicate layer of coagulated blood, of a bright red colour, within cavity of arachnoid. In chest, there was hypostatic consolidation with well-marked lobular pneumonia of both lungs, and recent pleurisy on left side.

In lower 22 inches of ileum, there were distinct traces of the old ulcers in Peyer's patches, but not the slightest evidence of recent disease. There was no deposit in the solitary glands, and the patches were not at all elevated or thickened, but most of them contained two or more smooth depressed spaces, about a quarter, or a sixth, of an inch in diameter. Their edges were nowhere thickened, but were gradually bevelled off, and many of them were covered with mucous membrane which moved freely upon the subjacent coats. Some of the depressions had more defined edges, and the membrane covering them was adherent. There was no puckering round any of them. In the large intestine were a few isolated depressions of a similar nature. None of the mesenteric glands were at all enlarged.

CASE XCII. *Enteric Fever, followed, five weeks from commencement of Convalescence, by an attack of Typhus. Recovery.*

Jane R—^{aged 20,} was taken ill on Sept. 27th, 1856, with headache, giddiness, and cold shivers; and on Oct. 6th, she was admitted into L. F. Hosp. The symptoms after admission were as follows: lenticular rose-spots appearing in successive crops; pulse varying from 108 to 120; diarrhoea; occasional vomiting; much pain and tenderness of abdomen, and tympanitis. There was no delirium, and the mind was

clear throughout the attack. The above symptoms lasted till about Oct. 20th (upwards of three weeks), about which date the patient became convalescent. At the end of the month she was able to get up; and for some weeks she assisted the nurse in the duties of the ward, in which there was a large number of patients suffering from typhus.

On Nov. 24th she was taken ill with pains in head and limbs, and loss of appetite. On Nov. 29th her symptoms were: pulse 132; great prostration; headache; little sleep; chest and abdomen covered with a distinct, mottled, florid typhus eruption; tongue thickly coated; bowels confined. On Dec. 1st, pulse 130; much moaning in sleep; eruption darker. On Dec. 3rd, pulse 126; some of spots distinctly petechial; countenance heavy and confused; conjunctivæ injected; occasional low delirium. The patient continued much in same state until Dec. 8th (or 15th day), when the pulse fell to 86, the tongue was clean, and there was copious perspiration. From this date she rapidly improved, and on Jan. 1st, 1857, she was discharged well.

CASE XCIII. *Typhus. Convalescence on 14th day. After an interval of three weeks, Enteric Fever lasting about nineteen days.*

Phoebe D—, aged 21, was adm. into L. F. Hosp. on July 3rd, 1857. Six other members of the same family, the youngest aged 8, and the oldest 50, were admitted on same day with well-marked typhus; all had rash well developed. Phoebe D— was taken ill five or six days before admission with headache, pains in limbs, loss of appetite, and chilliness. On July 4th, her pulse was 108; she had been very noisy and delirious during night; expression stupid; face dusky; conjunctivæ injected; copious measly typhus-eruption, not disappearing on pressure; tongue thickly furred, but moist; bowels opened by medicine. July 7th, pulse 108; tongue dry and brown; bowels very confined; rash much darker, and some of spots converted into petechiæ; still very delirious. July 11th, pulse 96. Patient feels and looks much better since yesterday; tongue moist; rash scarcely visible. On July 15th, she was ordered full diet with meat; on 20th, she was able to get up, and by the end of the month she had almost regained her strength. On Aug. 3rd, the patient lost her appetite, and suffered from headache; and, after two or three days, diarrhoea came on, the motions being watery and pale-yellow. Aug. 8th, pulse 100; slight headache; slept badly; tongue moist; very red at the tip and edges, with white fur along centre; three watery motions. On Aug. 13th, pulse was 120; and several lenticular rose spots were observed on chest and abdomen; great tympanitis and tenderness of abdomen; four watery stools; no delirium, and intelligence clear. Fresh rose spots continued to appear until 19th. On 21st, pulse 96; tongue cleaner; appetite beginning to return; and diarrhoea had ceased. From this date, convalescence advanced slowly, but steadily.

3. *The two diseases differ in their contagious properties, and in their mode of propagation* (see pp. 80 and 458 and pp. 85 and 465.)

4. *The two diseases differ in their mode of prevalence.* Typhus prevails in the epidemic form; enteric fever is an endemic disease, or its epidemics are circumscribed (see pp. 54 and 441, and Diagram I.).

It has been argued that the two fevers are identical, because examples of enteric fever are occasionally met with during epidemics of typhus; but, as a rule, enteric fever is equally prevalent when there is no typhus (see p. 442). Even an increased prevalence of enteric fever during an epidemic of typhus may be accounted for by a co-existence of the causes of the two diseases in an unusual degree (see pp. 49, 448). In the autumn of 1858, enteric fever and scarlatina were both epidemic at Windsor;¹ but no one would conclude from that circumstance that these two diseases are identical.

Moreover, it is found that epidemics of typhus always commence among the poorest and most crowded of the population, and do not spread among the rich, whereas enteric fever attacks rich and poor alike, and often commences in the best and most ventilated localities.

5. *The increased prevalence of enteric fever after a long continuance of hot weather does not hold good with regard to typhus* (see pp. 65 and 447).

6. *While the poison of typhus appears to be generated and propagated by over-crowding of human beings with deficient ventilation, that of enteric fever appears to be developed during the fermentation of organic, for the most part fæcal, matter* (see pp. 118 and 496).

¹ MURCHISON, 1859 (3).

CHAPTER VI.

SIMPLE CONTINUED FEVER OR FEBRICULA.

SECTION I.—DEFINITION.

A SPORADIC, non-contagious disease, arising from exposure to the sun, fatigue, surfeit, inebriety, etc. Its symptoms are frequent, full, and often firm pulse; white tongue; thirst; constipation; high-coloured urine; hot and dry skin; no eruption; severe headache, and sometimes acute delirium; the fever subsiding in from one to ten days, with copious perspirations, herpetic eruptions, etc.; rarely fatal in Britain, except from complications; but, when death occurs, no specific lesion.

SECTION II.—NOMENCLATURE.

1.—Names derived from its continued character.

Σύνοχος? (Greeks); Synocha vel Synochus simplex (Riverius, 1623; Hoffmann, 1700; Juncker, 1736; Burserius, 1785); Synocha (Sauvages, 1760; Linnæus, 1763; Cullen, 1769); La Fièvre Synoque (Davyasse, 1847); Synoshische (Germ.); Febris continua simplex (Lieutaud, 1776); Simple Continued Fever (Modern Writers).

2.—From its supposed Inflammatory or Ardent Character.

Σύνεχης φλεγματώδης? (Greeks); Febris sanguinea? (Avicenna); Synocha sanguinea? (Sennertus, 1641); Feb. acuta sanguinea (Hoffmann, 1700); Acute Continual Fever (Langrish, 1735); Simple Inflammatory Fever (Huxham, 1739; Fordyce, 1791); Febris acuta simplex (Storck, 1741); Synocha plethorica and Ephemera plethorica (Sauvages, 1763); Febris continens inflammatoria simplex (Selle, 1770); Febris acuta (Ploucquet, 1791); Entzündungsfieber and Entzündliche Fieber (Reil, 1794, etc.); La Fièvre angioténique (Pinel, 1798); La Fièvre angioténique pure et simple (Bovillard, 1826); Fièvre inflammatoire (French); Febbre infiammatoria (Ital.)

Καῦσος (Hippoc.); Causus sive Febris ardens (Galen; Willis, 1659; Boerhaave, 1738); Synochus causonides (Forestus, 1591; Mangetus, 1695); La Calentura? (Piquer, 1751); Causos (Vogel, 1764);

Enecia Cauma (*Mason Good*, 1817); Ardent Fever (*Burnett*, 1812; *Ranald Martin*, 1841; *Copland*, 1844); Ardent Continued Fever (*Morehead*, 1856).

3.—From the absence of Putrid or Typhoid Symptoms.

Synochus imputris? (*Galen*); Febris continua non putrida (*Lemnius*, 1563; *Boerhaave*, 1738; *Quarin*, 1781); Synocha sine putredine (*Sennertus*, 1641); Synocha non putris (*Bellini*, 1732).

4.—From its Duration.

Febris septimanaria (*Platerius*, 1656; *Sprengel*, 1814); Ephemera plurium dierum (*Sennertus*, 1641; *Juncker*, 1736); Synocha septimo die soluta (*Hoffmann*, 1700).

Febris ephemera (*Riverius*, 1623; *Sennertus*, 1641); (*Sauvages*, 1760); Diary Fever (*Strother*, 1728); Ephemera simplex (*Boerhaave*, 1738); Febris diaria (*Juncker*, 1736; *Linnaeus*, 1763); Fièvre éphémère (*Davasse*, 1847); Febricula (*var.*, and *Jenner*, 1849, not the Febricula of *Manningham*, see page 423); Das entägige Fieber (*Germ.*); Effimero (*Ital.*); Efemera (*Span.*). d d

5.—From its Causes.

Ephemera a frigore and E. a calore (*Sauvages*, 1736); Sun-Fever /60
(*Scriven*, 1857).

SECTION III.—HISTORY AND ETIOLOGY.

Simple Continued Fever has been referred to by many authors from the time of Hippocrates to the present day. For example, *Reverius* described several varieties of a '*febris simplex*,' arising from non-specific causes. Concerning one of them, '*ephemera*,' he observed: '*Ephemera plerumque generatur a causis externis; intra viginti quatuor horas plerumque solet terminari.*' From this, he distinguished '*synochus simplex*,' arising from the same causes and presenting the same symptoms, but lasting from four to seven days.¹ *Sennertus* also distinguished between '*ephemera*' and '*ephemera plurium dierum.*'^k *Strother*, in our own country, described a '*diary fever*,' as distinct, on the one hand from '*spotted fever*' (typhus), and on the other from '*slow fever*' (enteric). The diary fever, he said, resulted 'from hard drinking, or too great heat of the sun, or from a little cold;' it needed 'little help from physic;' and it did 'not last above three or four days.'^l

¹ RIVERIUS, 1648, ed. 1690, p. 421.

^k SENNERTUS, 1619.

^l STROTHER, 1729, p. 159.

Unlike the fevers already considered, Simple Continued Fever is independent of any specific poison, and is, therefore, not contagious. Its ordinary causes are exposure to great heat or cold, surfeit or inebriety, gastric derangement, imperfect excretion, and mental or bodily fatigue. Many cases are designated Simple Fever or Febricula, which are in reality mild or abortive cases of typhus or enteric fever, or relapsing fever without the relapse, or catarrh with an unusual amount of febrile disturbance. The typhus and enteric poisons occasionally give rise to symptoms so mild and indefinite, and of so short duration, that an accurate diagnosis is impossible, unless well-marked cases of either fever occur in the same house at the same time (see pp. 187 and 547). Accordingly, the term Simple Fever has become a refuge for many cases of uncertain character. This circumstance, coupled with the fact that Simple Fever is characterized by no peculiar eruption or anatomical lesion, and that it rarely proves fatal in this country, except when some complication supervenes to which the febrile symptoms are naturally referred, has induced some observers to doubt the existence of Simple Fever, as distinct from the fevers already described. Dr. Tweedie, for example, in his Lumleian Lectures, expressed the opinion, that all cases of so-called 'Febricula' were mild cases of typhus or relapsing fever, and did not think 'that a new nosological term should be introduced merely to accommodate such cases.'^m But from what has been stated, it is obvious that the recognition of Simple Fever is not a modern innovation; and I am satisfied that cases of short fever, independent of any specific poison, are occasionally met with in this country; while in certain parts of the world, where typhus and relapsing fever are unknown, Simple Continued Fever is a common disease. My observations in India and Burmah convinced me that the Common Continued Fever, the Ardent Fever, and the Sun-Fever of the tropics, are nothing more than severe forms of the Simple Fever or Febricula of Britain. For additional evidence as to the existence of such a disease as Simple Continued Fever, reference may be made to the excellent monograph of DAVASSE,ⁿ who, like Riverius and Sennertus, distinguished between a *Fièvre Éphémère* and a *Fièvre Synoque*, according to the duration of the malady; to the published lectures of Sir W. Jenner^o and Dr. Lyons,^p and to various

^m TWEEDIE, 1860, p. 415.ⁿ DAVASSE, 1847.^o JENNER, 1850, xxiii. 312; and 1853, p. 417.^p LYONS, 1861, p. 53.

works on tropical diseases, particularly those of Morehead^a and Sir Ranald Martin.^r

Simple Continued Fever is a sporadic disease, and does not prevail as an epidemic in temperate climates. Ingrassias, of Palermo, however, described an epidemic of Simple Fever, which prevailed in Sicily in 1557. It commenced with rigors, which were followed by burning heat, violent headache, flushing of the face, vertigo, quick, full, and firm pulse; the symptoms subsided after four days, and the disease, although alarming, was far from being fatal: bleeding was the sole remedy. A similar epidemic, but more severe, was observed by Hoyer at Mulhausen towards the end of the summer of 1700.^s These epidemics closely resembled the Ardent Continued Fever of the tropics, and may possibly have been due to similar causes. In India, the Ardent Fever often assumes an epidemic form during the hot dry season.

The number of cases of Simple Continued Fever admitted into the London Fever Hospital since 1847, is given in Table LXI., page 684).

Of 2,232 cases admitted into the London Fever Hospital during twenty-three years, 1,025 were males, and 1,207 females. (See p. 62).

Young persons and adults appear to be more liable to Simple Continued Fever, than persons advanced in life. The mean age of 845 cases, admitted into the London Fever Hospital during ten years (1848-57), I ascertained to be only 22·82, which is nearly four years less than the mean age of the entire population (see p. 62). Of the total number, 789, or upwards of 93 per cent., were under forty-five. In the tropics, it is the young and robust and persons newly arrived from temperate climates who are most liable to suffer from Ardent Fever.

SECTION IV. SYMPTOMS AND VARIETIES.

Simple Continued Fever presents several varieties, according to the circumstances under which it appears and its duration. The following is the clinical history of some of the chief varieties:—

1. The patient is seized rather suddenly with chills or rigors, followed by quick (100-120), full pulse; flushed face; dry, hot

^a *Clin. Res. on Dis. in India*, 2nd ed. 1860, p. 162.

^r *Influence of Tropical Climates*, 1856, p. 204.

^s OZANAM, 1835, ii. 6.

skin; white, furred tongue; great thirst and loss of appetite; confined bowels; scanty, high-coloured urine; severe headache, restlessness, and sleeplessness; or sometimes drowsiness, and pains or sensations as from bruising, in the limbs. These symptoms may subside suddenly in twelve, twenty-four, or thirty-six hours, with copious perspiration, and then the disease resembles a single paroxysm of ague, and is appropriately designated *Ephemera*.

2. But occasionally the pyrexia is prolonged over several days. It may last four, seven, or even ten days (rarely longer), and it increases in severity with its duration. The pulse is 120 or more, and is full and often hard or bounding; the thirst and the heat of the skin are intense; the headache is more acute than in either typhus or enteric fever; sometimes it is described as throbbing or darting, and occasionally it is followed by delirium. The febrile symptoms usually terminate abruptly, with copious perspiration. This variety corresponds to the *Synocha* or *Inflammatory Fever* of many writers, and to the *Fièvre Synoque* of Davasse. The difference in duration alone distinguishes it from *ephemera*; and there are many gradations between the two forms.

The crisis in *ephemera* and *synocha* does not always take place by perspiration. The cessation of the fever is sometimes attended by copious epistaxis or hæmorrhage from the uterus or rectum, by vomiting or diarrhœa, or by a copious deposit of lithates in the urine. In many cases I have observed an eruption of herpes on the lips or nose, towards the termination of the fever. This eruption, indeed, is so common, that some practitioners speak of *herpetic fever*. There is no characteristic eruption in any form of Simple Continued Fever. In a few cases Davasse observed pale bluish spots, not elevated above the surface and not disappearing on pressure.* These are the *taches bleuâtres* of French writers, already described and figured, which are occasionally met with in enteric fever and in other diseases, and which therefore do not constitute a specific character (see p. 515 and Plate V.).

3. The *Ardent Continued Fever* of the tropics is merely an exaggerated form of the *synocha* of Britain. The following is a brief account of the leading characters of this fever, as I observed it among the European troops at Calcutta in 1853, and in Burmah in 1854. The disease chiefly attacked the

* DAVASSE, 1847, p. 23.

young plethoric recruits, recently arrived from Europe. It prevailed mostly in the hot, dry months (April and May), when the thermometer varied from 92° to 106° Fahr. and was never below 84° . In many cases the symptoms commenced immediately after incautious exposure to the direct rays of the sun. The disease was ushered in with chilliness or rigors, or occasionally with nausea or vomiting. The pulse soon rose from 100 to 120, and was full and firm. The others symptoms were: dry, burning skin; flushed face; giddiness; intense headache; ringing in the ears; intolerance of light; muscæ volitantes; restlessness and sleeplessness; tongue covered with a thick, yellowish fur; lips parched; great thirst; constipation; and scanty, dark urine of high specific gravity, depositing numerous crystals of lithic acid. About the fourth or fifth day there was often acute delirium, followed by more or less unconsciousness, contracted pupils, and sometimes complete coma. Between the sixth and the ninth day, death took place by coma, or there was a copious perspiration, followed by a rapid fall of the pulse, an increased flow of urine, an abundant deposit of lithates, and convalescence. The subsidence of the fever was occasionally followed by sudden, or even fatal, collapse.^u

4. It is a subject for investigation whether there may not be another variety of Simple Continued Fever, in which the symptoms are more asthenic, and the duration more prolonged, than in the varieties above-mentioned. The patient loses his appetite and strength; the pulse ranges from 90 to 120 and is rather feeble; the tongue is slightly furred; the bowels are confined; there is more or less headache, and the sleep is disturbed. These symptoms may continue for two or three weeks without any great change, except increasing weakness. On several occasions, I have known attacks of this sort follow great mental or bodily fatigue.^v This variety might be designated *Asthenic Simple Fever*. At the same time, it must be remembered that cases of this sort are never fatal, and that enteric fever often assumes characters very like those now described (see pp. 547, 588, and 591).

^u See MURCHISON, *On the Climate and Diseases of Burmah*, Edin. Med. and Surg. Journ. Jan. and April, 1855; also, MOREHEAD, *Op. cit.* p. 165; and R. MARTIN, *Op. cit.* p. 204.

^v See also HUDSON, 1867, p. 262.

SECTION V.—COMPLICATIONS.

When local complications occur in the course of simple continued fever, the pyrexia is usually regarded as symptomatic of the local lesion. Cases, however, are occasionally met with, where the fever is out of all proportion to the local disease, or where the constitutional symptoms subside suddenly with free perspiration about the seventh day, and then it may be doubted if the local disease be not a complication of a general pyrexia. Cases of this sort, as Sir W. Jenner observes, are apt to make medical men overrate the efficacy of drugs in the treatment of acute diseases.

SECTION VI.—DIAGNOSIS.

From what has been stated, it is obvious that the diagnosis of simple continued fever is sometimes impossible. Although it differs from typhus and enteric fever in its short duration and in the absence of any eruption, yet in abortive attacks of both these fevers there may be no eruption, and the duration may not exceed a few days. An eruption of herpes on the face about the fourth or fifth day of an attack of fever would, in the absence of pneumonia, favour the supposition of simple fever, but is not incompatible with typhus (see p. 215). The diagnosis may sometimes be assisted by the very severity of the febrile symptoms, which is usually greater at the commencement than in either typhus or enteric fever. In this respect, simple fever more resembles the first paroxysm of relapsing fever, from which it is distinguished by the absence of severe muscular and arthritic pains, of enlargement of the spleen and liver, and of jaundice, and by its occurring at times or places in which relapsing fever does not prevail. The difficulty of diagnosis between simple fever and acute local inflammations has been referred to under 'Complications.'

SECTION VII.—PROGNOSIS AND MORTALITY.

Simple continued fever, when uncomplicated, is rarely, if ever, fatal in this country. The numerous deaths from simple fever recorded weekly by the Registrar-General are due for the most part to enteric fever with latent abdominal symptoms. The ardent fever of the tropics is a very serious and often fatal disease. d

SECTION VIII.—ANATOMICAL LESIONS.

Simple continued fever has no specific lesion. In the cases of ardent fever, which I dissected in India, there was great congestion of all the internal organs, particularly of the lungs, liver, and spleen. The right side of the heart was full of firmly coagulated blood. The sinuses of the brain and the pia mater were also very vascular, and occasionally there was an increased amount of intracranial fluid.

SECTION IX.—TREATMENT.

The simple continued fever of this country requires no special treatment. A purge, followed by saline diaphoretics and diuretics, and those measures recommended under the head of typhus for relieving headache and other symptoms, are usually all that is necessary.

For the ardent fever of the tropics, more active interference is necessary. All writers on Indian diseases recommend venesection, or leeches to the head, at the commencement of the attack, followed by the cold affusion, the continued application of cold to the shaven scalp, purgatives, and diaphoretics: * and from my own observations, I am inclined to think that life is often sacrificed by adopting less active measures.

For the asthenic form of simple continued fever, the best remedies are quinine and the mineral acids, with a nutritious diet, and wine.

* MOREHEAD, *Op. cit.* p. 166; MARTIN, *Op. cit.* p. 208.

CHAPTER VII.

ON THE RATE OF MORTALITY OF CONTINUED FEVERS AT DIFFERENT PLACES.

THE rate of mortality of each of the continued fevers has been considered in the preceding chapters. But in the official returns of many hospitals, no distinction is made

TABLE LXI.*

Years	Typhus	Relapsing	Enteric	Febricula	Total	Deaths	Mortality per cent.
1848	786	13	152	16	967	166	17.16
1849	154	30	138	79	401	65	16.21
1850	130	32	137	62	361	50	13.85
1851	68	256	234	56	614	43	7.00
1852	204	88	140	129	561	50	8.91
1853	407	16	212	152	787	149	18.93
1854	337	5	228	144	714	110	15.40
1855	342	1	217	62	622	110	17.68
1856	1,062	...	149	89	1,300	230	17.69
1857	274	...	214	72	560	99	17.67
1858	15	...	180	44	239	35	14.64
1859	48	...	176	36	260	50	19.23
1860	25	...	95	33	153	37	24.18
1861	87	...	161	49	297	47	15.82
1862	1,827	...	220	95	2,142	399	18.62
1863	1,309	...	174	46	1,529	232	15.17
1864	2,493	...	253	109	2,855	491	17.19
1865	1,950	...	523	172	2,645	498	18.82
1866	1,760	...	582	286	2,628	443	16.85
1867	1,396	...	380	222	1,998	326	16.31
1868	1,964	3	459	132	2,558	370	14.46
1869	1,259	768	369	53	2,449	330	13.47
1870	631	903	595	94	2,223	217	9.76
Total .	18,528	2,115	5,988	2,232	28,863	4,547	15.75
Deducting 11 patients dead before reaching hospital, and 357 who died within 24 hours . . .					28,495	4,179	14.66
Deducting 431 additional, who died within 48 hours					28,064	3,748	13.35

* The numbers given in this Table are made up of those contained in Table XI., p. 234, Table XXXI., p. 397, Table LII., p. 599, and of the cases of Simple Fever. The numbers for 1848 include the 260 doubtful cases alluded to in note p. 51, of which 17 were fatal.

between the different fevers; and therefore a few remarks are necessary on the rate of mortality of the four fevers taken collectively. The preceding Table shows the rate of mortality of all the cases of 'continued fever' admitted into the London Fever Hospital during 23 years. H

From this Table, it appears that out of 28,863 cases 4,547 died, or the mortality was 15·75 per cent., or 1 in 6·34. Deducting the cases which were dead or moribund on admission, the mortality was 13·35 per cent., or 1 in 7·48.

The mortality from continued fevers in fourteen other hospitals I have ascertained to be as follows:—

TABLE LXII.

Hospitals	No. of Cases	Deaths	Mortality per cent.
Cork Fever Hospital, 1817-69	92,230	3,732	4·04
Dublin Fever Hospital, Cork Street, 1804-68	190,681	13,421	7·03
Royal Infirmary, Dundee, 1839-70	16,504	1,315	7·96
" " Bristol, 1840-57	1,800	179	9·47
" " Aberdeen, 1840-69	11,784	1,166	9·89
St. Thomas's Hospital, 1852-7	1,107	110	10·
Seraphim Hospital, Stockholm, 1840-51	3,186	339	10·6
St. George's Hospital, 1851-6	911	103	11·3
Newcastle Fever Hospital, 1848-57	1,481	171	11·54
Royal Infirmary, Edinburgh, 1840-67	22,586	2,622	11·61
City of Glasgow Fever Hospital, 1865-70	5,785	703	12·15
Royal Infirmary, Glasgow, 1840-69	33,420	4,250	12·71
Nottingham General Hospital, 1843-51	845	108	12·78
King's Coll. Hospital, Dr. Todd's cases,* 1840-58	328	60	18·29

The excess of mortality in the London Fever Hospital was partly accounted for by the circumstance that a large proportion of the patients were the aged and the infirm inmates of the metropolitan workhouses. The remarkable effect of advanced age in increasing the mortality of typhus has already been pointed out (see p. 236). The chief explanation, however, is to be found in the circumstance that no fewer than 24,516 of the 28,863 cases (or 84·94 per cent.) admitted into the London Fever Hospital were examples of either typhus or enteric fever. Simple continued fever being rarely fatal, and the mortality of relapsing fever seldom exceeding 1 in 25 or 50, while the mortality of typhus is nearly 1 in 5, and that of enteric fever almost as great, it is evident that the mortality from continued fevers taken as a whole must always rise in accordance

* These results have been obtained from the published reports, or from some of the officials, of the hospitals in question.

* *Brit. and For. Med. Chir. Rev.* Oct. 1860, p. 331.

with the preponderance of typhus and enteric fever. For example, in the year 1851, when one-half of the cases admitted into the London Fever Hospital were either relapsing fever or febricula, the total mortality from continued fevers did not exceed 7 per cent., or it was less than that in any of the hospitals above mentioned over a series of years. Again, while the total mortality from 'fever' in the Glasgow Infirmary is below that of the London Fever Hospital, that of typhus and enteric fever is about equal, and that of relapsing fever is nearly three times as great (see pp. 235, 398, and 600); the gross difference is mainly owing to the much larger proportion of relapsing cases included in the Glasgow returns (see pp. 313 and 315). Lastly, in the year 1843, when the fever in Scotland was mainly relapsing, the total mortality from 'fever' in the Edinburgh Infirmary did not exceed 6·85 per cent., while in the Glasgow Infirmary it was only 4·5 per cent., and in the Aberdeen Infirmary 3·75 per cent.

It is obvious that in comparing the mortality from 'fever' at different times and places, in order to judge of the merits of different plans of treatment or for other purposes, it is absolutely necessary to take into account, not only the age and other circumstances of the patients,^a but also the species of fever which has prevailed. If this be not done, the comparison is of little worth. It is also necessary to have recourse to large numbers. Twelve successive cases of typhus terminating in recovery may appear a remarkable success; but if 5 out of the next 8 cases die, the total mortality is 20 per cent. When large numbers are employed, there is a striking equality in the rate of mortality at different places of each of the continued fevers.

In Ireland, where fever has always been very prevalent, its mortality has been remarkably small, when compared with that of other places. This circumstance was pointed out in 1838 by Dr. Cowan, of Glasgow;^b it was dwelt on at some length in my essay on the Etiology and Mortality of Fevers;^c and a striking illustration of the fact is furnished by the statistics of the Fever Hospitals of Cork and Dublin in Table LXII. Moreover, the rate of mortality from fevers in Ireland varies less in different years than in England and Scotland. Thus, while in the hospitals of Britain the mortality was in some years as low as 4 per cent. and in other years upwards of 20 per cent.,

^a J. B. RUSSELL, 1866.

^b COWAN, 1838, p. 21.

^c MURCHISON, 1858, No. 1.

in no year since 1817 has the mortality in the Dublin Fever Hospital reached 10 per cent., and at the Cork Fever Hospital in only one year has it exceeded 6 per cent. This small mortality from continued fevers in the hospitals of Ireland is probably due to a greater preponderance of relapsing and of simple fever than in the hospitals of Britain, for there is evidence that typhus alone is often as fatal in Ireland as in Britain (see p. 242). It has been already shown that relapsing fever is the principal fever which the Irish have at different times imported into Britain (see pp. 56 and 318), while in mixed epidemics of typhus and relapsing fever the proportion of relapsing cases has been much greater in Ireland than in Scotland or England (see pp. 40, 44, and 49). Dr. H. Kennedy remarks, that it is an erroneous impression that the fever commonly present in Ireland is typhus. He adds:— ‘Under my own observation, I have occasionally seen the spotted cases (typhus) constitute one-third of those in hospital. In the epidemic of 1847–8 those with spots were very rare, not occurring oftener than once in fifteen cases. The disease, as seen then, was essentially a relapsing fever; at least, it was so in Dublin.’^d Relapsing fever, however, is not a disease constantly prevalent in Ireland. Ten years ago, I found on enquiry, that it was as rare in that country as in Britain (see p. 315); and the last British epidemic of relapsing fever scarcely implicated Ireland, and did not originate there. Hence, in the intervals of great epidemics, the small mortality of ‘fever’ in Ireland is probably due to a preponderance of simple continued fever, and not of relapsing fever. That this is really the case appears from the reports of the Cork Fever Hospital, which is the only Irish hospital, in the reports of which I have found the different continued fevers distinguished and classified.^e During nine years (1861–9) 8,345 cases of ‘Continued Fever’ were admitted into this hospital, of which 4,534 were ‘Synochus or Simple Fever,’ 3,623 ‘Typhus,’ and 148 ‘Typhoid.’ Of the cases of simple fever, only 29 were fatal.

It is a subject for inquiry, why cases of simple continued fever, which are the exceptions in the hospitals of England, are the rule in those of Ireland. Many of them are, no doubt,

^d KENNEDY, 1860, p. 217.

^e Whether the different Continued Fevers be regarded as species or varieties, it is to be regretted that the reports of most Irish hospitals afford no information concerning the number of each form annually admitted.

abortive cases of typhus or enteric fever (see pp. 187 and 547), while there are grounds for believing that others are a modification of relapsing fever. In epidemics of relapsing fever, it has been noticed that two of its most characteristic features—the relapse and the jaundice—have become less frequent as the epidemic declined, until the disease seemed to merge into what, under ordinary circumstances, would be regarded as simple continued fever (see pp. 363 and 379). Dr. Steele, in his report of the epidemic at Glasgow in 1847, wrote thus:—‘Towards the termination of 1847 and at the commencement of 1848, the relapse, usually considered the pathognomonic feature of the malady, was frequently absent, and the primary attack became prolonged to an indefinite extent; but the cases still retained the other symptoms characteristic of the disease at this particular period. As the year advanced and the numbers diminished, the relapses became less frequent, until they began to form the exception rather than the rule; and the disease ultimately assumed a mild form of synochus, the characters of which it has continued to retain to the present time.’^f Dr. David Smith made a similar observation at Glasgow, in 1843.^g Dr. Seaton Reid, in his report of the epidemic of 1847 at Belfast, distinguished between ‘*Relapsing Synocha*’ and ‘*Synocha*’ or ‘*Febricula*.’ Of the former, 1,014 cases came under his care, and of the latter 1,238 cases, of which 23 were fatal. The latter had a duration of seven or eight days, and resembled the first paroxysm of relapsing fever, but was never followed by a relapse.^h Lastly, Dr. Purefoy, writing of relapsing fever in Ireland in 1853 observed:—‘The disease yet continues in the country the same in essence, but modified by time and a variety of attendant circumstances.’ Among the modifications, it is stated that the relapses were uncertain and irregular.ⁱ

^f STEELE, 1849.

^g SMITH, 1844 (2).

^h *Irish Report, Bib.*, 1848, viii. 303.

ⁱ PUREFOY, 1853.

CHAPTER VIII.

ON THE RELATIVE MERITS OF ISOLATING FEVER PATIENTS ~~OR~~ OF DISTRIBUTING THEM IN THE WARDS OF A GENERAL HOSPITAL. *And*

THE important subject to be discussed in this chapter is one on which considerable difference of opinion exists. On the one hand it is believed, that 'it would be better to have no hospitals at all, than to mix cases of typhus, small-pox, and scarlet fever with patients suffering from other diseases;' while, on the other, influential sanitary reformers have declared that all cases of infectious disease ought to be distributed through the wards of general hospitals, and that Fever-Hospitals and fever-wards are at all times 'a crime against humanity and a disgrace to the age in which we live.'

The establishment of Fever Hospitals in Britain dates from the commencement of the present century (see p. 37). In 1802 Dr. John Clark of Newcastle collected the opinions of the most eminent physicians of the day, such as Dr. Matthew Baillie Dr. Heberden, Dr. Saunders, Dr. Lettsom, Dr. Willan, Dr. Ferriar of Manchester, Dr. Haygarth of Chester, Dr. Falconer of Bath, Dr. Beddoes of Bristol, Drs. Gregory, Hamilton, and Rutherford of Edinburgh, etc., who were all strongly in favour of separate Fever-Hospitals and fever-wards, in preference to mixing fever patients with general cases.^j For example, Dr. Ferriar observed: 'Previous to the establishment of fever-wards, when a patient happened to be seized with an infectious fever in the Manchester Infirmary, the disease was apt to spread to an alarming degree, so as to require a general dismission of the patients. But since these wards have been opened, though bad fevers have been accidentally introduced, yet by removing the patient on the first attack, the disease has always been prevented from extending.'^k

^j CLARK, 1802; see also HAYGARTH, 1801; and STANGER, 1802.

^k FERRIAR, 1810, vol. iii.

H The circumstance, that most of the nurses and other officials of Fever Hospitals contracted fever, produced, after a lapse of years, a reaction in favour of the system of mixing the patients. In 1842, Dr. Graham of Edinburgh corresponded on the subject with many hospital physicians in London and elsewhere, including Dr. Bright, Dr. Williams, Dr. Latham, etc. Their opinions were unanimously hostile to separate fever-wards, and favourable to the mixing of fever-patients with others, *provided the proportion was kept low*.¹ The latter arrangement has since been advocated by Sir R. Christison^m and Dr. J. H. Bennett,ⁿ and in non-epidemic seasons by Messrs. Bristowe and Holmes.^o

H In 1860, I issued on behalf of the committee of the London Fever Hospital a printed circular to 64 hospitals in the United Kingdom, with the object of ascertaining the mode of dealing with fever patients. Replies were received from 40; viz., from 11 in London; 20 in the provinces of England; 4 in Scotland; and 5 in Ireland. Of the 11 London Hospitals, 8 admitted a very limited number of fever cases among the general patients, while 3, viz., University College, the London, and the Marylebone General Infirmary admitted no cases of fever. Of 20 hospitals in the provinces of England, 9 refused to admit fever-patients; 6 admitted them into separate wards, and only 5 distributed them among the general patients. There were also at least 6 hospitals for the special treatment of fever in the provinces of England. In every one of the 4 Scotch hospitals (Edinburgh, Glasgow, Aberdeen, and Dundee) there were separate fever-wards.^p In Edinburgh alone, the managers permitted two fever-beds in each of the clinical wards (of 19 beds) for the purpose of instructing the students. Of the 5 Irish Hospitals, 1 was limited to fever cases; in 3 there were separate fever-wards; and in only 1 were the fever cases distributed among the general patients. Moreover, in most of the large towns of Ireland, there was a special hospital for the treatment of contagious diseases. With the exception of London, then, the prevalent custom was, and still is, to isolate cases of contagious fever. The different practice in London is due partly to the desire of affording to students the opportunity studying cases of fever, and partly to the circumstance that *a large proportion of the fever cases admitted into the London*

¹ GRAHAM, 1842.^m CHRISTISON, 1850.ⁿ *Clinical Lect.* 2nd ed. p. 878.^o *Sixth Rep. of Med. Off. of Privy Council.*^p Since 1860, an hospital specially for fever has been erected in Glasgow.

Hospitals are examples of enteric fever, which never spreads in the wards like typhus (see p. 461). But even in the London Hospitals, it is universally admitted that there is danger of true typhus spreading, if the number of cases be greater than 1 in 5, or 1 in 6; so that practically, the necessity of a Fever Hospital for the surplus, which during epidemics may be enormous, is conceded. Every one who has paid any attention to the subject admits that, even in seasons when the disease is not epidemic, patients with typhus ought not to be treated in their own crowded homes, where the fever would inevitably spread; and it is clear that they must be removed either to Fever-Hospitals, or special fever-wards, or be interspersed among the other patients of a general hospital. The latter plan appears to me objectionable on the following grounds/ :-

- I. *There are numberless instances where, notwithstanding the most careful precautions, typhus has spread in general wards, when the proportion of cases has not exceeded 1 in 6, or where it has spread from even a single case.* 6

When I was a clinical clerk at Edinburgh in 1849, three typhus patients admitted into the clinical wards containing 38 beds, communicated the disease to 7 of the other patients, of whom 2 at least died. Dr. Stewart states that 'during the winter of 1837-38, an isolated case of typhus, in one of the medical wards of the Glasgow Infirmary, communicated the disease to most of those in the same ward, and several died.'¹ Dr. Peacock says, that when he was a student in Edinburgh, 'it was determined by the managers of the Infirmary to try the effect of distributing the patients throughout the other wards, in the hope that the poison might by such means be so diluted as to prove innocuous. As an experiment, four patients labouring under fever were placed in different parts of each ward, which usually contained 30 beds, and 4 beds were removed from the ward, so that each patient with fever occupied the space of two ordinary patients, and their beds were placed in the piers between two windows, and these were kept constantly open. Notwithstanding these precautions, the fever spread to the patients in the adjoining beds, and in a month no less than 12 such cases of infection occurred. Nor did the evil stop here; for one patient, who had been in a bed next to a fever patient, went out, sickened of fever after reaching her

¹ STEWART, 1840, p. 297.

home, and spread the disease in a crowded court in Leith, previously free from any fever.' Dr. Peacock adds, that he has seen typhus spread in several other hospitals where the patients were mixed, although the space allotted to each patient was most ample.' Writing in 1838 of St. Bartholomew's Hospital, Dr. West stated that out of 60 cases of typhus 14 had died, and he added: 'Since last summer, 11 gentlemen who were in the habit of frequenting the hospital have been attacked by the fever, to which 3 have fallen victims; 16 nurses and 21 patients admitted for other affections have likewise suffered from the disease, which terminated fatally in 10 instances, and I do not doubt that many similar cases occurred, which did not come under my notice. Seventeen of the 60 cases, to which my observations especially refer, were those of persons, who had either been in attendance on the sick, or who had at least lived in the same house: 9 of the 17 were the cases of patients who, admitted into the hospital for other affections, were while there attacked by fever. . . . It was at last found necessary from the disease spreading from bed to bed, to close one of the female wards.'^a Again in 1864, 19 persons contracted typhus in the wards of St. Bartholomew's Hospital, of whom 5 were nurses; of these 19, 5 patients and 3 nurses died.^c At King's College Hospital, in 1856, 'a single patient admitted with typhus communicated the disease to the patients on each side of him, and this was the beginning of an outbreak in the ward.' Again, on December 10, 1861, before typhus was epidemic in London, a single typhus patient was admitted, who communicated the disease to a patient in the adjoining bed, and also to the nurse of the ward, and once more in 1863, a lady-sister and a nurse were the victims of typhus caught in the wards. Yet this hospital 'is well known to be a model as to roominess and careful ventilation.'^u At Guy's Hospital there was a great outbreak of typhus towards the end of 1862; into one ward containing 50 patients 1 or 2 typhus cases were admitted, and the disease spread rapidly; no fewer than 7 patients in this ward took the fever, which in 5 instances was fatal. Yet in this ward there was an allowance of 1,998 cubic feet to each patient with good ventilation, and the fever patients were placed with a window on each side of their beds.^v In the Old St. Thomas's Hospital at London Bridge, the spread of typhus among the patients was a common occurrence, and in 1865 at the

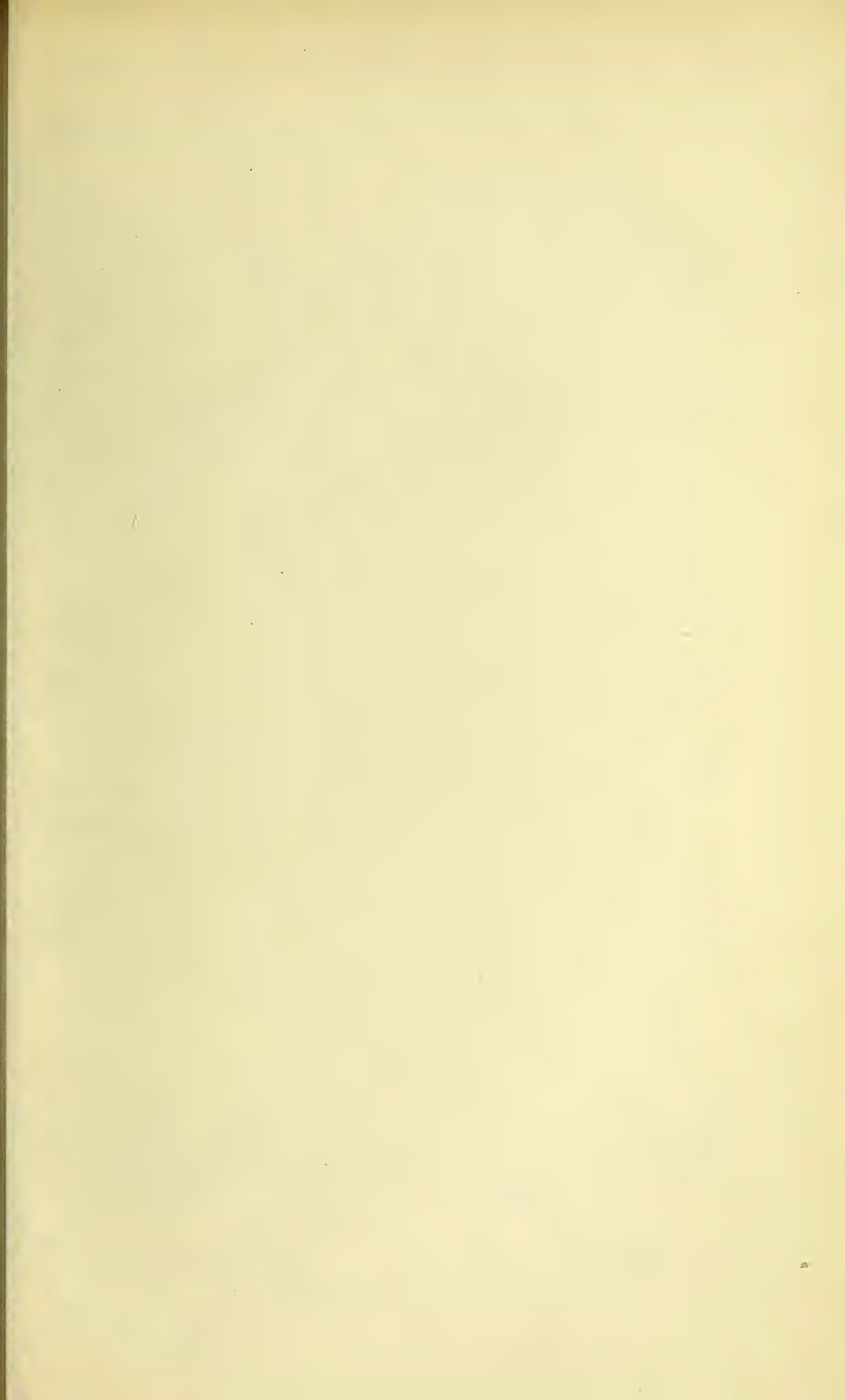
^a PEACOCK, 1856 (1), p. 162.

^c WEST, 1838, p. 144.

^e E. L. Fox, 1866.

^u ANSTIE, 1865, i. 632.

^v HABERSHON, 1862.



In 1873 a case of typhus was admitted into the Charité Hospital at Berlin; from this patient the disease spread to 14 persons (11 patients and 3 nurses) of whom 3 died.

Lond. Med. Record. Oct. 8/73.

temporary hospital in Surrey Gardens, 3 nurses and a patient took it.^w At Charing Cross Hospital, 1 case of typhus was admitted on October 28, 1862, and within a few weeks 7 cases originated on the same floor, of which several were fatal; ^x and in 1864, 5 patients were brought to the London Fever Hospital, who had contracted typhus in Charing Cross Hospital. In the Westminster Hospital typhus has repeatedly spread, and at one time in the summer of 1865, of 13 typhus patients in the hospital, 8 had contracted it there.^y During the year 1867, 18 cases of typhus were under treatment in the Middlesex Hospital, one of the best ventilated hospitals of the metropolis. Of these 5 had acquired the disease in the hospital, a nurse and 4 patients; 3 of the 4 patients died.^z During the years 1860-1, when typhus was not epidemic, the London Fever Hospital was in the condition of a general hospital, with a sprinkling of typhus cases, and thoroughly ventilated. On August 23, 1860, a nurse was seized with typhus; there were only 2 cases of typhus in the hospital at the time, admitted on August 6 and 16, and prior to the former date no patient had been admitted with typhus since June 30; in March 1861, another nurse was attacked, there being again only 2 cases of typhus in hospital at the time, and only 6 cases having been admitted in the previous five months. In the autumn of 1863, 1 case of typhus 'having been introduced into the North Staffordshire Infirmary, the disease spread quickly; 2 of the nurses were attacked, and 1 died; several of the general patients were also attacked, and, to add to the disaster, certain patients left the institution from sheer terror, and conveyed the poison and the disorder into families residing in the neighbourhood.'^a In the Bristol Royal Infirmary, 48 cases of typhus were under treatment during the winter of 1864-5, 2 cases being placed in each ward, with an allowance of from 1,035 to 1,057 cubic feet per patient. Of the 48 patients 12 died; while 17 (of whom 5 died) of the 48 contracted the disease in the hospital.^b It would not be difficult to add many other instances of a like sort to those now mentioned; ^c but the above suffice to prove that when a few cases of typhus are treated in the same wards with other patients, the disease is apt to spread, notwith-

^w *Lancet*, 1865, i. 145.

^y *Ibid.* 1865, i. 632.

^z *Med. Times and Gaz.* 1864, i. 569.

^c See, for example, E. L. Fox, 1866.

^x *Ibid.* 1863, i. 36.

^z *Statistical Report.*

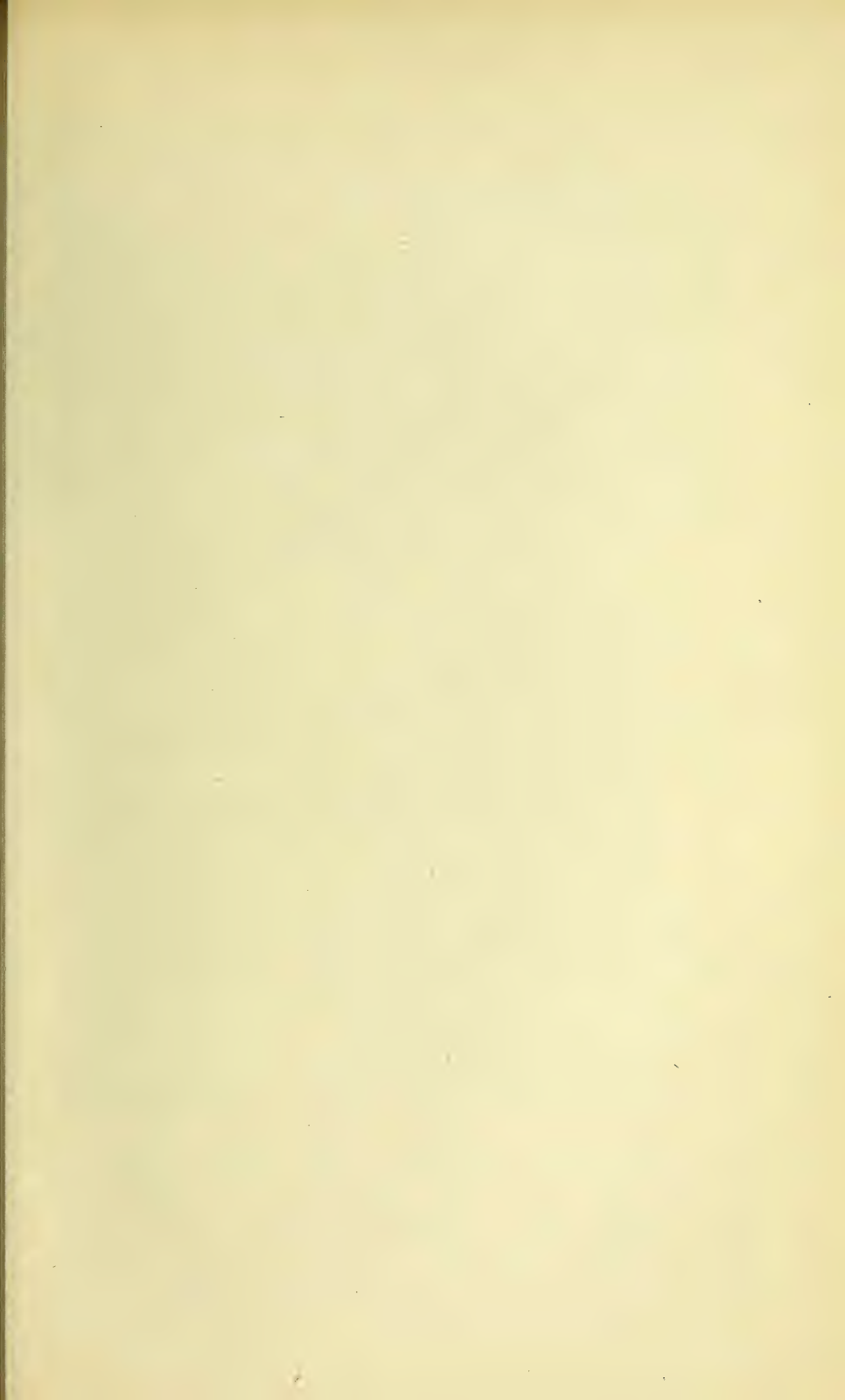
^b E. L. Fox, 1866.

standing the most ample space and thorough ventilation, and that such occurrences are not 'few and meagre,' as has been alleged.

II. *The two objections usually urged against Fever-Hospitals and fever-wards, that, owing to the concentration of the poison, the mortality among the patients themselves, and the danger of the disease spreading are increased, are contradicted by facts.*

Take, for example, the London Fever Hospital. It has already been shown that the rate of mortality for each species of continued fever has not been greater there than what has been observed in the general hospitals of London (pp. 235 and 600); while during 23 years (1848-70) 17,980 (18,268-288) cases of typhus were admitted into the Fever Hospital and communicated the disease to 288 persons, viz.: 217 nurses and officials (of whom 44 died), and 71 patients (of whom 16 died). In other words, one person caught the fever for every 62 admitted, and one person lost his life for every 300 admitted; one nurse caught typhus for every 83 admitted, and one died for every 408 admitted; while only one patient caught the disease for every 253 admitted, and only one died for every 1,123 admitted. In reference to these results also, two circumstances must be mentioned. The first is, that the nursing staff of the Fever Hospital was during all these years undergoing constant change; in the recent epidemic as many as 70 new nurses would be engaged in one year, and it may be said that on an average the entire staff was changed annually. If the services of the nurses had been retained after they had been seasoned by an attack of fever, comparatively few would have been attacked. The second is, that up to the close of 1861, there was no classification of the patients in the Fever Hospital. The cases of typhus were treated in the same wards with cases of enteric fever, scarlatina, and other diseases; the wards were in fact like those of a general hospital, but with a large preponderance of typhus cases, and although subsequently to 1861, the typhus cases were isolated, the classification was often broken through in consequence of the crowded state of the hospital. What would have been the consequences if the 17,980 patients admitted into the Fever Hospital had been distributed among the general hospitals of the metropolis, may be imagined from the comparison about to be made.

During the first six months of 1862, 1,107 cases of true



typhus were under treatment in the London Fever Hospital, of which 232 died, or the mortality was 20·95 per cent. In the same period, 343 cases of typhus were under treatment in 6 of the general hospitals in the metropolis, mentioned below, of which number 80 died, or 23·32 per cent. The 1,080 (1,107-27) cases admitted into the Fever Hospital communicated the disease to 27 persons, of whom 8 died. In other words, only 1 person took the fever for every 40 admitted, and only 1 died for every 135. But the 272 cases admitted into the six general hospitals communicated the disease to 71 persons, of whom 21 died; or 1 person caught the fever for every 3·8 cases admitted, and 1 life was lost for every 12·9 cases admitted. What would have been the result, if there had been no Fever Hospital, and the 1,080 cases admitted into it had been distributed among the general hospitals in addition to the few hundreds which were actually treated in them? Yet, in the midst of this epidemic, the abolition of the Fever Hospital was advocated!

TABLE LXIII.^a

Hospitals	No. of Admissions of Typhus	Cases contracted in Hospital	Total	Deaths
St. Mary's—Jan. 1st. to June 30th, 1862 .	16	1	17	3
St. Bartholomew's, " " " .	89	23	112	30
St. Thomas's, " " " .	92	12	104	16
Guy's, " " " .	40	21	61	21
Middlesex—Jan. 1st to Sept. 30th " .	25	6	31	8
German—Dec. 1st, 1861, to Feb. 28th, 1862	10	8	18	2
Total	272	71	343	80

Table LXIV. shows a similar comparison between the results observed at five of the general hospitals of London and the London Fever Hospital over a period of four years, 1862-5.

From this Table it appears that 1 person took typhus for every 5 typhus patients admitted into the general hospitals, but only for every 67 admitted into the London Fever Hospital; and

^a For the facts contained in this and the next Table I am indebted to Dr. Broadbent, of St. Mary's; the late Dr. Edwards, of St. Bartholomew's; Drs. Wilks and Steele, of Guy's; Drs. Bristowe and Hicks, of St. Thomas's; Dr. G. Johnson, of King's College Hospital; and Dr. H. Weber, of the German Hospital. For the most part, the cases of typhus originated among the attendants and other patients in the wards, into which typhus cases had been admitted; but of the 6 cases in Middlesex Hospital only one originated in a ward in which were typhus cases; still, there had been no such thing as typhus appearing in the hospital, until after the admission of certain cases at the beginning of 1862. (See also p. 89).

TABLE LXIV.

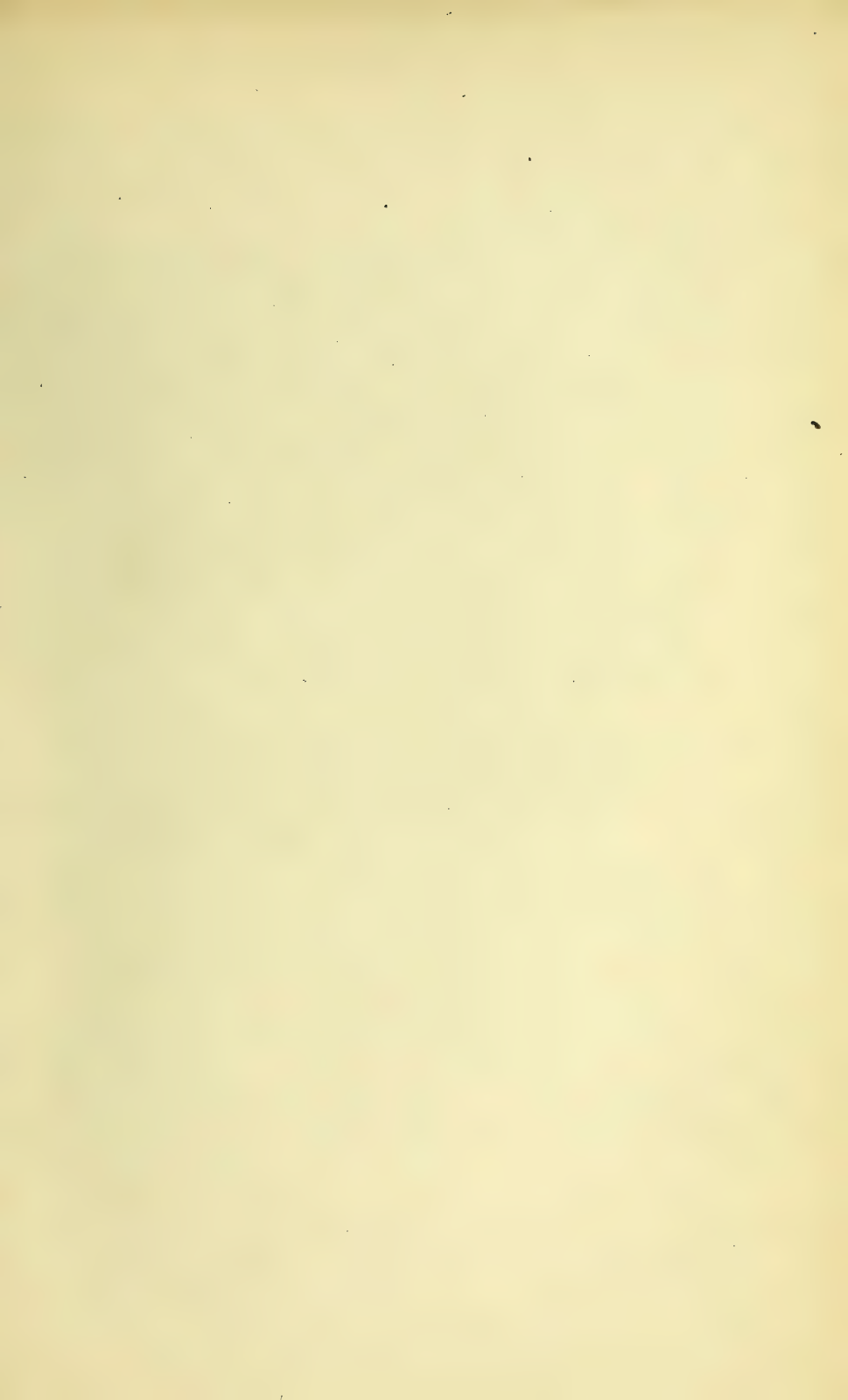
	Patients admitted with Typhus		Cases of Typhus contracted in Hospital						Total cases under treatment		
			Patients		Nurses and Officials						
	No.	Died	No.	Died	No.	Died	No.	Died	Mortality per cent.		
Guy's Hospital	95	10	8	5	18	8	121	23	18.10		
St. Thomas's Hospital .	154	21	4	2	19	2	177	25	14.12		
German Hospital . . .	59	17	1	...	1	...	61	17	27.86		
King's College Hospital	90	22	11	5	12	4	113	31	27.43		
London Hospital . . .	9	5	...	...	6	2	15	7	46.66		
Total	407	75	24	12	56	16	487	103	21.15		
London Fever Hospital*	7,498	1,413	30	3	81	20	7,609	1,413	18.57		

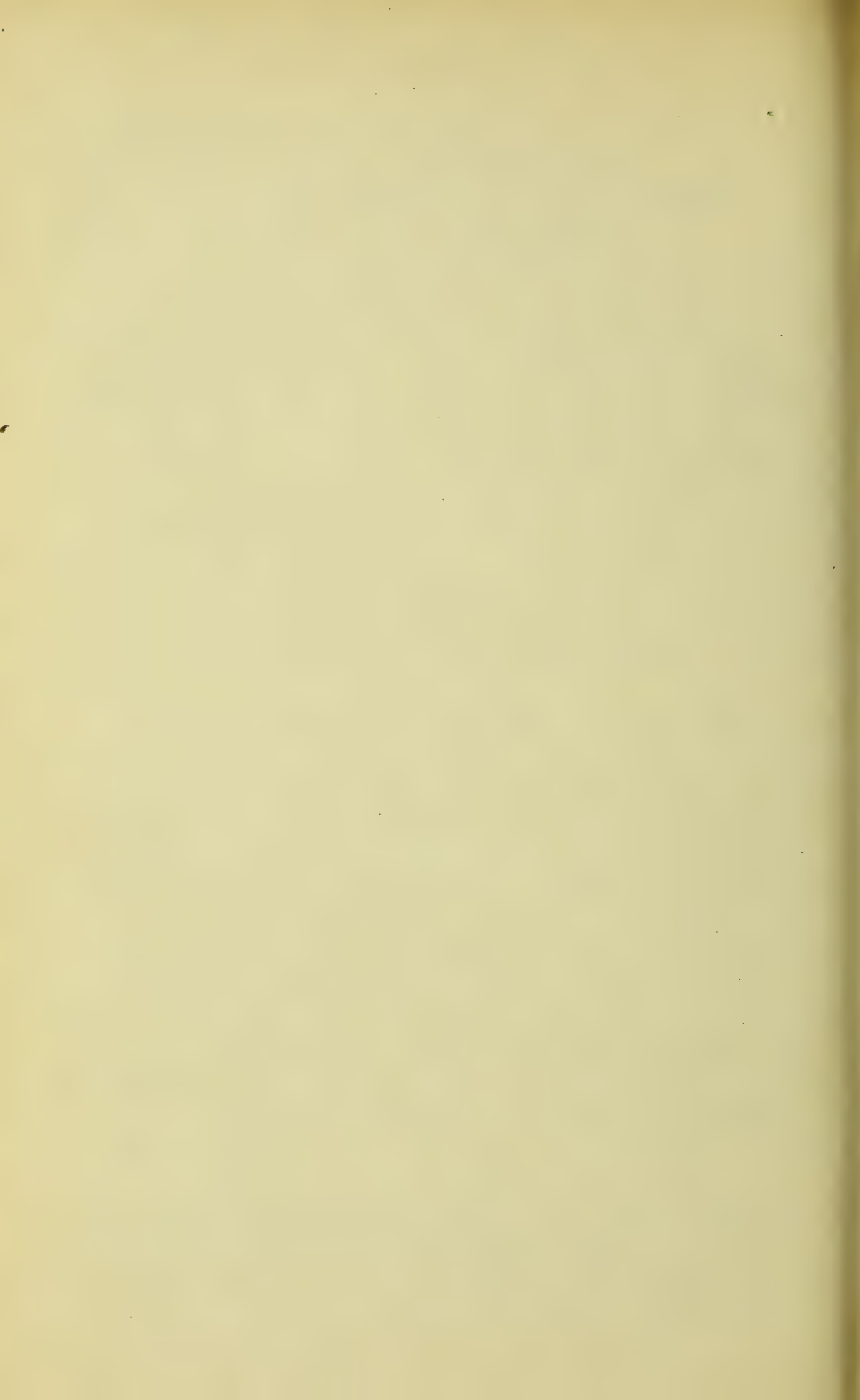
that one person died of typhus for every 14 admitted into the former, but only for every 326 admitted into the latter. This difference would have been greater if the arrangements at the Fever Hospital had been more perfect than they were. (See p. 694.)

The question resolves itself into this. A certain number of cases of typhus having to be treated, how can this be done with most advantage to the patients, and with least danger to the attendants? From what has been stated I think it is legitimate to infer, that on the plan of isolation, provided there be ample ventilation, they can be treated with equal advantage to themselves and with far less danger to the attendants, in proportion to the number of cases treated. That the attendants even in a well-ventilated Fever Hospital run a greater risk than the attendants in a general hospital, there can be no doubt; but this is due, not to a concentration of the poison, but to the foci of contagion being more numerous. If 2,000 cubic feet of space be allowed to each patient,^f and if there be thorough ventilation, there need be no more concentration of the poison in a Fever Hospital, than in general wards with a sprinkling of fever cases.

* From Table XI, p. 234, it appears that the admissions for Typhus into the Fever Hospital during the years 1862-5 amounted to 7,579, but this number included the 81 nurses and officials who contracted the disease in hospital.

^f This is the allowance at the London Fever Hospital.





III. *The maladies for which patients are ordinarily admitted into general hospitals predispose them to contract typhus on exposure to the contagium, and to have it in a severe and fatal form.*

In the outbreak of typhus which occurred in Guy's Hospital towards the end of 1861, seven patients took the disease in one ward and five died. Of these, two who had been suffering from diabetes died on the third day of the fever, a third who had disease of the spine also died on the third day, and the two others died on the fifth day. In 1869, four patients who had contracted typhus in the London Hospital were transferred to the Fever Hospital; three of them died; one had been suffering from disease of the liver and kidneys, a second from acute nephritis, and a third from hemiplegia. Many similar instances have come under my notice, and in fact diseases of the kidneys, from which a large proportion of patients in general hospitals suffer, is well-known to be one of the most formidable complications of typhus. It appears to me unwarrantable to expose any patients admitted into a general hospital to the possible risk of contracting so serious a disease as typhus.

IV. *The ventilation, which is universally admitted to be necessary for preventing typhus spreading in a general ward, ~~would be~~ injurious to patients suffering from many diseases, such as nephritis, acute rheumatism, bronchitis, &c.*^A (2)

V. *In a Fever Hospital or fever-wards, it will be always possible to obtain a staff of officials seasoned by a previous attack of typhus, or of an age at which it is not very likely to be fatal, which it would be impossible to obtain for general hospitals.*

When possible, no nurse ought be engaged to attend on typhus patients, who is over 30 years of age (below which the rate of mortality is small), or who has not herself passed through an attack. Had this rule been more commonly observed at the Fever Hospital, its results as compared with those of the general hospitals would have been more favourable than they were.

My experience has led me to the following conclusions as to the proper mode of dealing with fever-patients:—

1. Cases of enteric fever may be distributed in the wards of a general hospital with impunity.

g. See Murchison, 1864.

2. Cases of typhus (and of relapsing fever) ought never to be treated in a ward with other patients; even in no larger a proportion than 1 in 6, there is danger of these diseases spreading.

3. There is no evidence that in a well-ventilated Fever Hospital the mortality from continued fevers is greater than in a general hospital.

4. In proportion to the number of cases of typhus treated, the danger of the disease spreading is much less on the plan of isolation, than on that of mixing.

5. Fever Hospitals are absolutely necessary in all large towns liable to epidemics of typhus, and they ought to be provided with the means of rapid extension by the erection of temporary buildings of wood or iron, in the event of an epidemic breaking out. (See p. 269.)

6. In all general hospitals, there ought, when possible, to be arrangements for the treatment of contagious fevers. Otherwise many acute cases, not contagious, are practically excluded. But the contagious cases ought not to be interspersed through the general wards; they ought to be isolated in separate wards,^s or better in a detached building.

7. In every Fever Hospital, typhus, relapsing fever, enteric fever, and scarlatina ought to be treated in distinct wards; but there can be no objection to the many cases of acute non-contagious diseases, constantly sent by mistake to Fever Hospitals, being treated in the same wards with enteric fever.

^s The experience of the London Fever Hospital has shown that when the cases of typhus have been rigidly isolated in distinct wards, the disease has rarely spread to the patients in other wards. In the Bath United Hospital 12 cases of typhus were admitted in 1864 within two months. They 'were uniformly placed in separate wards from the general patients, and there was not a single instance of spreading within it' (*Med. Times and Gaz.* 1865, i. 291). On the other hand, it would not be difficult to adduce instances in which typhus has spread from fever-wards in a general hospital; but in all with which I am acquainted the isolation has been insufficient, and in many there has been deficient cubic space, and deficient ventilation in the fever-wards.

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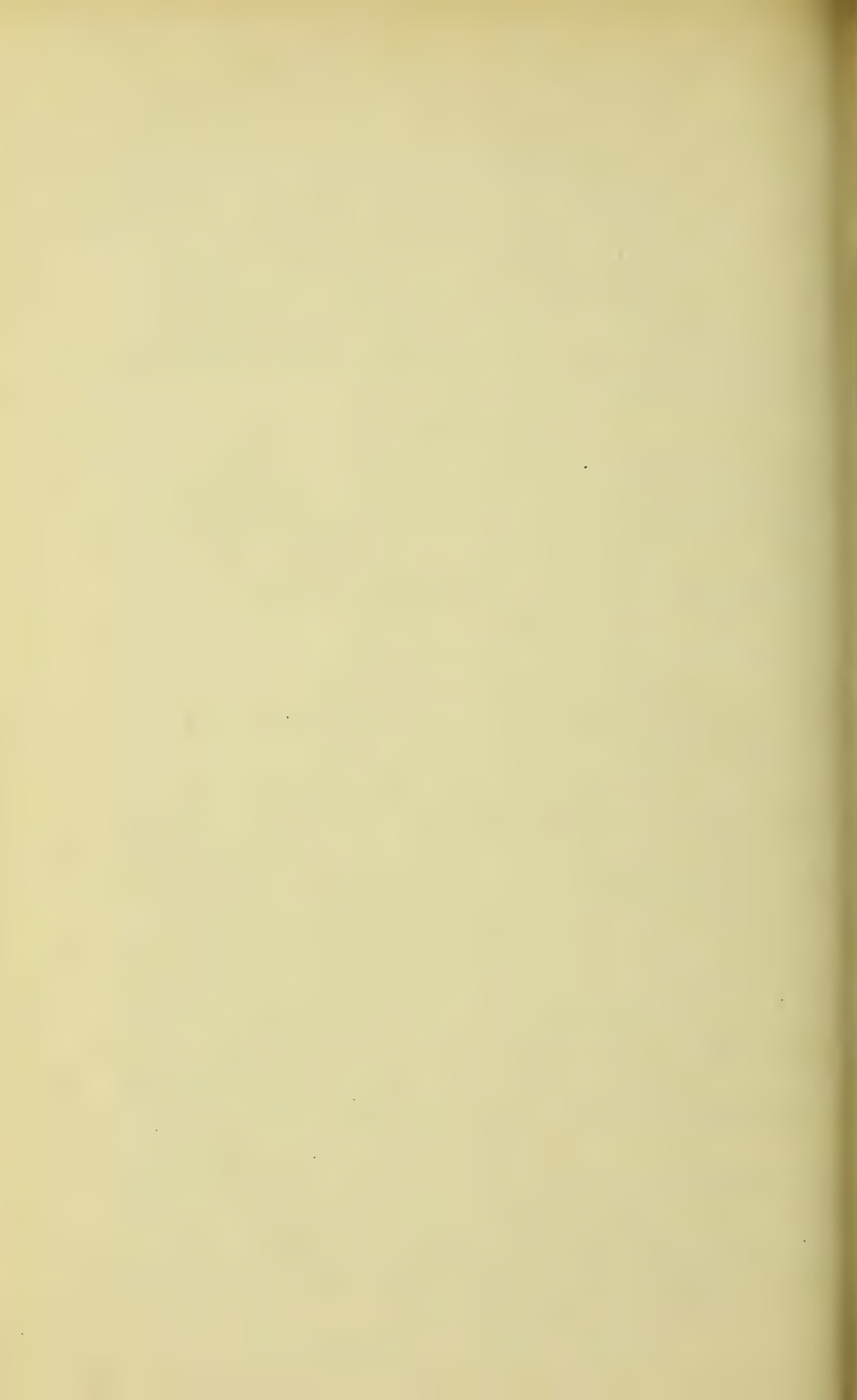
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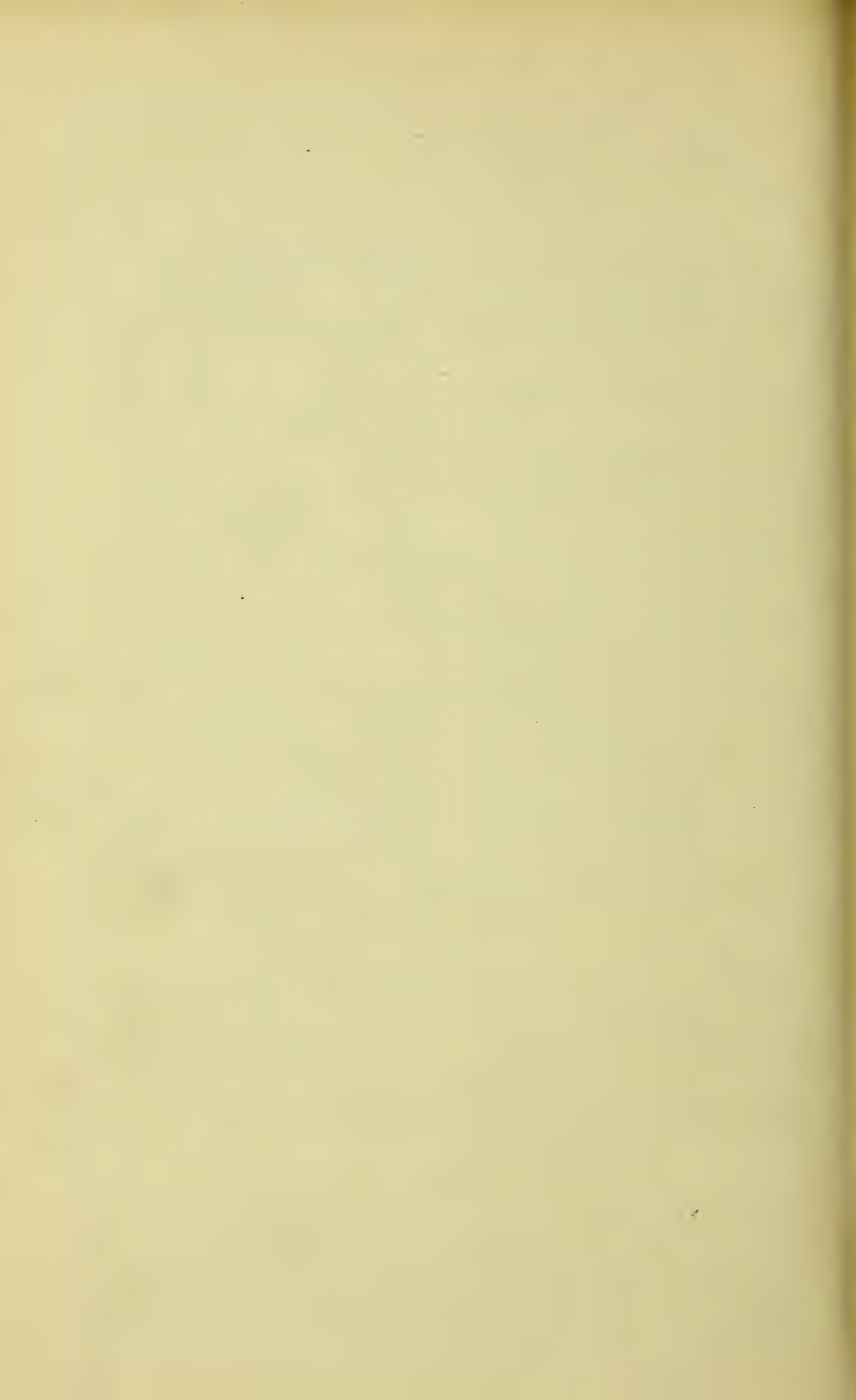
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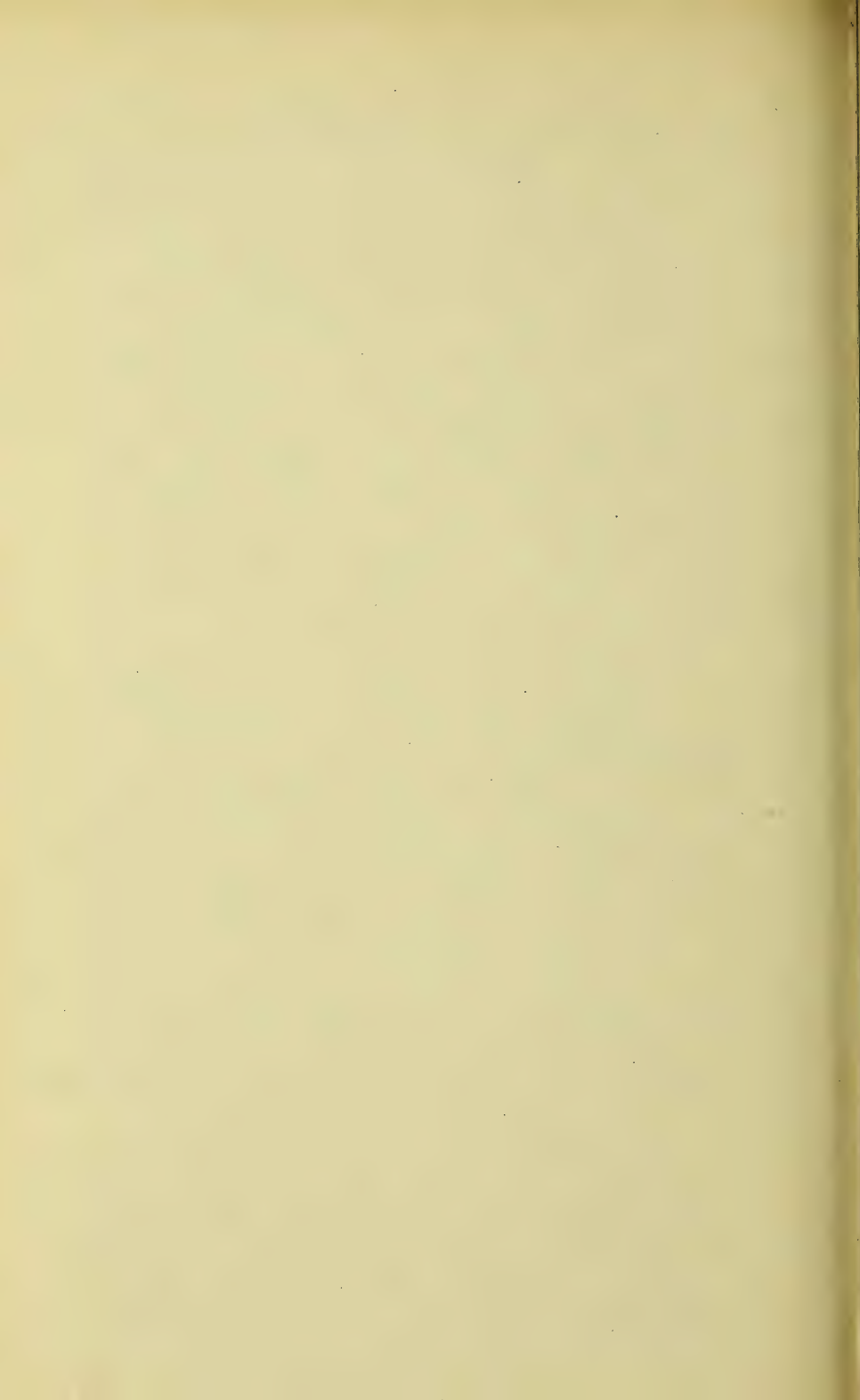
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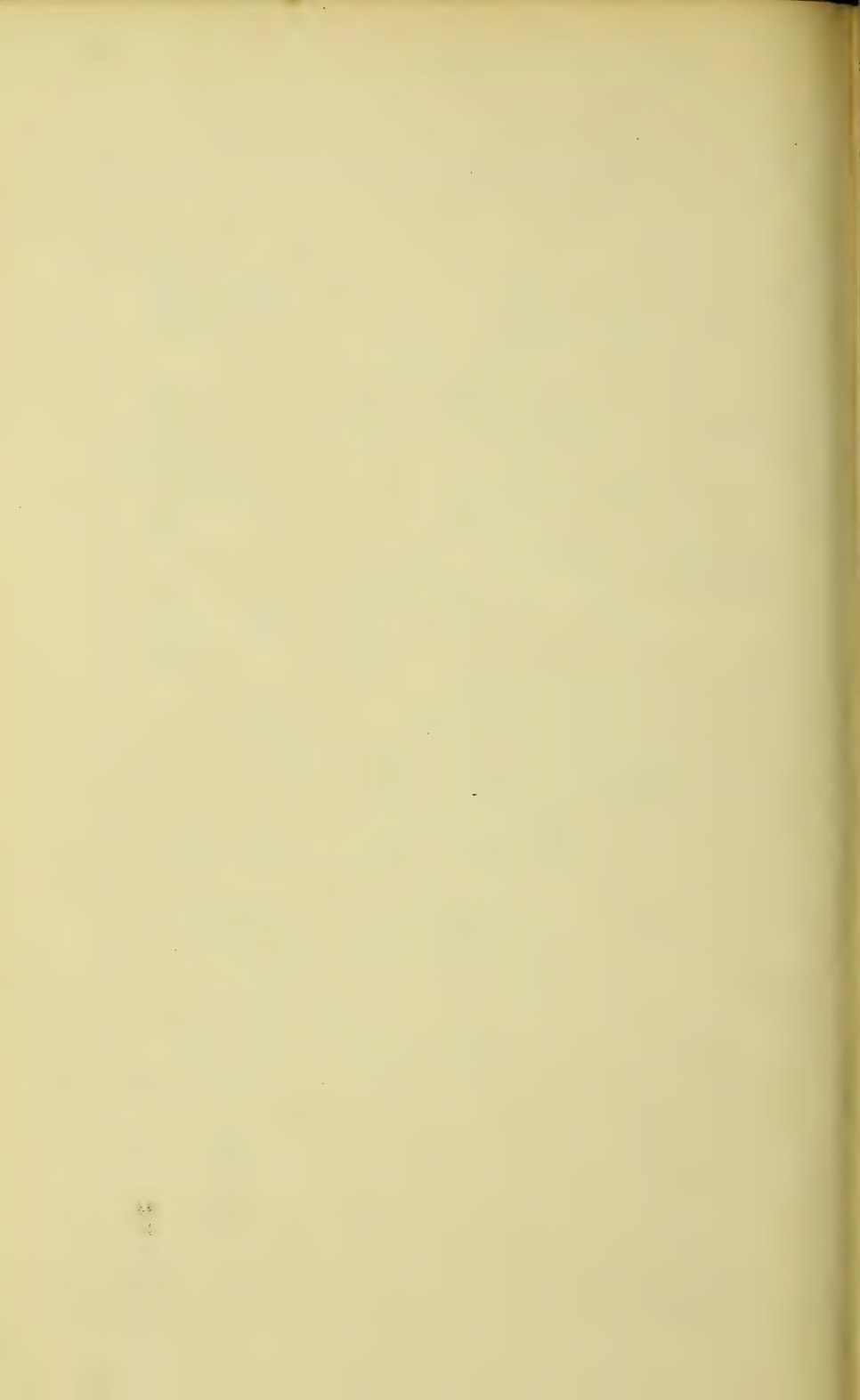
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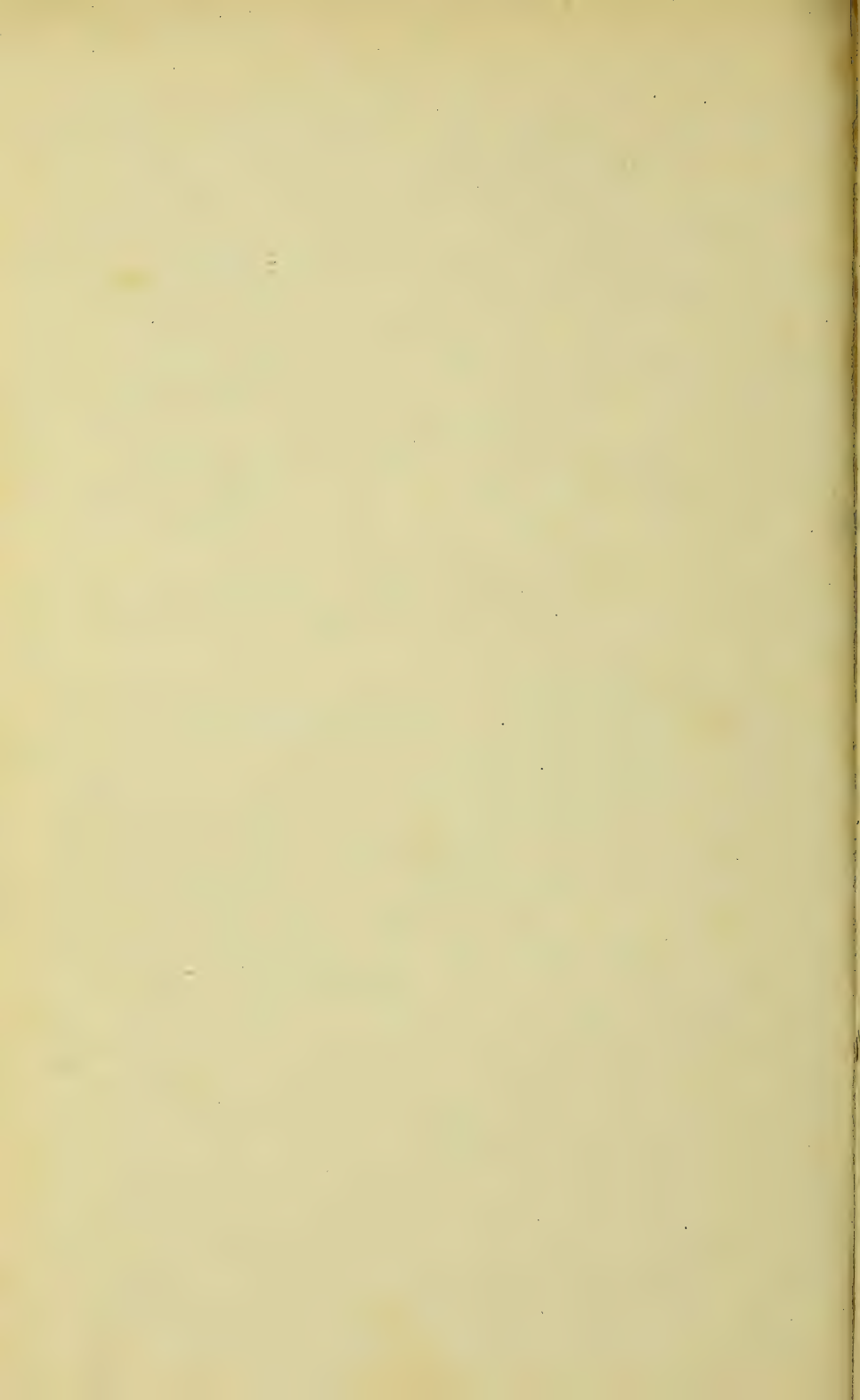
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